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ABSTRACT

Academic programs, recruitment, and student retention among minority students in the environmental and natural resource professions are examined. Major sections include: (1) environmental and resource studies at minority colleges (black and Native American institutions, institutions with significant Hispanic enrollment, and basic curricula); (2) minority students in environmental and resource programs at majority institutions (campus-wide and departmental concerns); and (3) action by other organizations including professional associations and industry. Broad-scale action is recommended, such as: a national committee or council to bring visibility to the issue and to recommend new initiatives; regional and special subject consortia to respond to opportunities and problems in particular geographic areas; and cooperation with education, engineering, biomedical interests for improved precollege mathematics and science education for minority students. It is also recommended that minority colleges concentrate on strong basic curricula and cooperate with other institutions, and that majority institution programs increase efforts to deal with minorities and minority issues. Other organizations and agencies should increase contacts with each other, provide introductory employment, and support university projects and students. Appended are lists of participants at the Human Environment Center Conference on College and University Education of Minority Students in Environmental and Natural Resource Fields (October 24-25, 1980), programs cited in this report, sources of lists of university programs in the environment and natural resources, and information on minority students on white campuses, including nontraditional predictors of academic success. (CC)

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Minority Education for Environmental and Natural Resource Professions

Report 2

HIGHER EDUCATION

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Human Environment Center

THE HUMAN ENVIRONMENT CENTER, established in 1976 as the Urban Environment Foundation, joins environmental and social equity interests. The Center pursues its objectives through research and publication of findings, monitoring and analysis of public policy and practice, and dissemination of current information. It brings diverse groups into coalitions for discussion and action, and for negotiation and advocacy among public and private bodies. The Center's annual report and publication list are available on request.

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Minority Education for Environmental and Natural Resource Professions

Report 2

HIGHER EDUCATION

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1302 18th Street, N.W.
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Minority Careers Program
Jean C. Durning, Director

May 1981

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The report was written principally by Jean C. Durning, Director of the HEC Minority Careers Program, with consultation and assistance from Sydney Howe, Executive Director, and was edited by Carrie Johnson. It incorporates information supplied to the Program by supportive contributors across the country. The assistance of Michael Moore of the EPA Workforce Development Staff is particularly appreciated.

Cover photos are courtesy of ~~(left)~~ Tuskegee Institute Pre-forestry Program and ~~(right)~~ Colorado State University Science Motivation Program. RIGHT LEFT

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Foreword

There are some obvious reasons for people and institutions in environmental and resource fields to cultivate minorities' interest: equal opportunity commitments and concerns, a desire to recruit talent from sources largely untapped, the chance to expand public understanding of these professions' purposes and worth. Those who teach, advocate, or employ in these fields will elicit more minority interest if they are versed in the relevance of environment and resources to the well-being of minority people.

But why should minority students venture into these fields, some of which are not notably lucrative and in which minority involvement has traditionally been so slight? A student's personal interests and aptitudes may be decisive, as in any career choice. One factor that is often influential, though, is a sense of relevance, an awareness of how these areas of study bear on personal, community and cultural needs. That perception can rouse students' interests and, if fostered by professors, counselors and employers, help young minority men and women to perservere in fields that are, for them, novel and untraditional.

Urban and Workplace Environments

Minority groups have special stakes in many forms of environmental protection and natural resource management. Disproportionate percentages of black, brown and other minority Americans live and labor, day in and day out, in more degraded and dangerous environments than those experienced by most Americans. Foul air, poor sanitation, disease-bearing vermin, inadequate recreational space and severe street hazards affect poor minorities inordinately. Pollution, waste, decay and crowding compound the physical and mental stress imposed by poverty.

As National Urban League President Vernon Jordan says, "Racism and economic exclusion confine a heavily minority class of Americans in malignant environments where pollutants converge and magnify each other's harm insidiously." While new freedoms of opportunity are essential to any release from poverty, Jordan observes, "We need jobs, but we also need to be healthy enough to hold those jobs." Unassailable data show that environmental poverty adds to the disease, crime and alienation that make the cycle of economic poverty so difficult to break.

Benjamin Hooks, Executive Director of the NAACP, puts it simply: "We can't have good schools and good health, decent housing and safe working conditions if our neighborhoods, homes and workplaces are not environmentally sound."

Minority environmental professionals can be particularly effective in several areas. For example, organized labor has gained professional capacities to fight workplace pollution and other hazards, although those struggles are by no means done. The nation's unorganized workers—low-paid, heavily minority, and often in the dirtiest jobs—have little or no such representation. Minority professionals in occupational health positions in industry, government, public-interest organizations, and labor itself could bring strong corrective influence.

Similarly, minority professionals in public health, pollution control, noise prevention, pest-control, and solid waste disposal can bring perspectives and compel attention that will make those professions serve urban minorities' needs. Minority authorities in recreation, park management, forestry, water resources, and horticulture would bring new representation and relevance to the policies, funding and practices of urban recreation (including swimming, boating and fishing), street-greening, and gardening programs. The urban poor's considerable stakes in weatherization and low-cost energy alternatives suggest other professional avenues for environmental gain.

Rural and Coastal Resources

While most minorities would gain from greater involvement in urban and industrial environmental protection fields, it is particularly important, for example, that Hispanic professionals take part in range management in the Southwest, that black foresters operate in the Southeast and that Indians be engaged in professional management of the Northwest salmon fishery.

In general, rural minorities have not benefited proportionately from the physical resources of their home areas. Their gain from "our" natural heritage has been the opportunity for low-paid manual labor on plantations, farms and ranches, and in the processing plants and packing houses of raw material and food industries. It is little wonder that resource conservation and wilderness protection have long been seen as irrelevant, at best, to minority concerns.

Just as new economic opportunity must lift people from urban ghetto poverty, such opportunity is also vital to real minority sharing in America's wealth of natural resources. Again, minority professional capacities can help to change the picture.

Native American peoples and their resources present both the most challenging and the most promising case. Indians are unique among U.S. racial minorities in their ownership of major land, mineral, water, forest and wildlife resources. Tribes' stakes in profitable, environmentally sound energy extraction, and in sustained soil, water and forest productivity—all of which require professional management—can hardly be overstated. The levying of fees for hunting, fishing and other recreation on Indian lands, a growing source of tribal income in some areas, calls for fisheries and wildlife expertise. Unfortunately, despite the potential for Native economic gain and self-fulfillment through resource management, the exceptional educational isolation of rural Indian youth has kept the number prepared and motivated for professional training distressingly small.

Blacks in rural areas, notably in the South, are sorely underrepresented in the forestry, soil conservation, water management and wildlife fields that apply to rural land management. The many-faceted efforts to stem the decline of black land ownership in the South would surely be aided by greater professional attention to sustaining and increasing the productivity of small farms and forests. Blacks concentrated along the south Atlantic and Gulf coasts traditionally have participated in marine industries as deck hands, crab-pickers, oyster-shuckers and resort workers. Lacking the capital for ownership or investment in such industries, minority people could well gain influence by pursuing professional training in marine science, fisheries management, water pollution control, coastal land management and related fields.

Hispanics have unrealized interests in water and grazing rights, grassland restoration, forestry, and management of the resource-harvesting industries of the Southwest. Hispanics joining the ranks of professionals in the public agencies and corporations concerned would no doubt bring new equity to the distribution of those natural-resource benefits. Similarly, Puerto Rico has special environmental, energy and resource concerns that call for more local professionals trained in air and water pollution control, soil and water management for sugar and other agricultural production, management of commercial and sport fisheries, and the resource protection and recreation management upon which tourism depends.

The Common Heritage

There is another sense in which environmental and natural resource professions matter to minorities. Minority people simply have an unequal share of our environmental quality and natural resource benefits that, according to familiar wisdom, are the common wealth of all Americans. Poor people, disproportionately minorities, benefit little from the great public land holdings of the West, and from most national parks, national forests, fish and wildlife refuges and state parks. Affluent Americans take these resources almost for granted, as theirs to enjoy, and many such lands provide the resources for profitable commerce and industry. Yet *every* American owns an equal share of these priceless assets.

Again, only economic justice can bring environmental justice, but minority professionals rising through the management ranks of government and industry can give impetus to the process. Minority career specialists entering the virtually all-white state natural resource agencies and regional, suburban and urban environmental, park, and planning agencies can help bring social equity to functions and jurisdictions where minorities seldom have shared resources equitably.

This is a report about minority education for environmental and natural resource career positions, but it is not written solely because so few minorities

occupy those positions. Arching over our concern for that disparity is our hope that environmental management will earn a new perception among minority people at large—as an effort for them as much as for anyone, and, where minorities are stuck in the worst environments, as work meant especially for them. That is what should be.

Given the facts of race and racism today, and the lingering presence of some exclusionary "environmentalism," racial and ethnic integration of these professions is vital to their integrity and to their commitment to serve all people. Minority professionals can help environmental and natural resource management serve and draw participation from many kinds of people who do not now perceive the fields' policies and processes as relevant, much less responsive, to their communities and concerns. Surely, equitable sharing of resource benefits and protection of our common environment are worthy life goals for any person.

Sydney Howe, Executive Director
Human Environment Center

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I

Introduction

Members of racial and ethnic minority groups make up nearly 17 percent of the total civilian work force in the United States. In natural resource fields, however, minority professionals are still rare. The U.S. Forest Service, for instance, had 96 minority foresters last summer, more than in the past but still just 1.67 percent of the total. In some federal agencies, one of every 25 natural-resource professionals is a minority-group member. In other public agencies and among private employers, the ratio may be one of 50 or even less.

Much more must be done to reach equitable representation in these fields, to engage minority students' talents, to foster all Americans' involvement in managing their natural heritage and to help more minority communities tackle the environmental and resource problems affecting their physical and economic health.

The Human Environment Center is engaged in a long-term program to increase minority students' access to careers in environmental and natural resource fields. This report, on higher education, follows *Minority Education for Environmental and Natural Resource Professions: Report 1, Before College*, which the Center published in August 1980. The Center's overall program is described in the introduction to *Before College*.

Sources

The experiences and recommendations herein are derived from numerous contacts with people and programs throughout the United States. Many of those sources are mentioned at various points in this report. Particularly valuable were the deliberations of the educators, practitioners and other consultants who met in an invitational conference convened by the Center in Washington, D.C., on October 24–25, 1980. They are listed in Appendix A.

The Center is extremely grateful to all who have shared their ideas and experiences so thoughtfully and candidly.

The Professions

As noted in *Before College*, this project focuses on the scientific professions most engaged in managing the environment and natural resources: those concerned with plant and animal (including human) life and with combatting pollution of the air, water and land. These professions include traditional conservation fields such as forestry, range management, soil conservation, wildlife and fisheries biology and management, landscape architecture, park management, hydrology, geology and agronomy. Other fields such as chemistry, civil and chemical engineering, meteorology, toxicology, ecology, general resource conservation and planning are also within this sphere, as are the environmental concerns of medicine, public health and occupational health.

Some of these professions, of course, are also involved in "non-environmental" work. By the same token, resource management increasingly draws on experts in "non-environmental" fields. Lawyers, economists, public administrators and others are as valuable in many projects as scientists and engineers.

Ethnic Groups

This program is concerned with the minority groups that are statistically underrepresented among science majors in American colleges: Blacks, Mexican Americans, mainland Puerto Ricans, and Native Americans. Asian Americans, while experiencing discrimination in other areas, do participate in science education in proportion to their numbers, and are therefore not discussed herein. It should be noted, however, that available statistics, which consider Asian Americans and Pacific Islanders as a single category, may well hide inadequate representation of specific ethnic groups.

We recognize that women of all backgrounds are still underrepresented in environmental and natural

resource fields, but that problem is beyond the scope of the Center's current project.

Assumptions

This report is primarily addressed to administrators and educators, especially in majority institutions, in departments teaching the science-related skills that prepare students for environmental and resource careers. But it will also interest a wider readership, including those involved in pre-college education and career exploration for minority students, potential employers, and others concerned about environmental health, economic progress and social equities.

This audience is diverse. It includes groups that may not understand each others' assumptions and experience. So, at the risk of belaboring what is obvious to many, here are reminders of the complications inherent in some common generalizations.

Minorities in the U.S. Not all minority persons are disadvantaged; not all disadvantaged are minorities. While many minority persons live in inner cities, others are from small towns or rural areas, and some from suburbs.

Minority youths receiving professional training often come from educated families. However, because minorities' overall economic and educational opportunities have been restricted, increasing the number of professionally educated minorities means enlisting more college students who are the first generation of their families to attend college. Such students often come from supportive families, but many lack the experienced counsel at home which other students enjoy. They have a special need for knowledgeable, perceptive advisors.

Native American peoples are especially diverse in backgrounds and outlooks. Within and between the various Indian nations there are strong differences of opinion on how and whether to develop their lands and resources.

The Environment. The word "environment" carries many connotations, some of which are emotionally charged. Although literally meaning "surroundings," it will be used in this report to refer to physical aspects of the natural and man-made worlds. It includes air, land, water, plants and animals. It also encompasses the facilities and communities in which people live and work, and the places where natural resources are produced and harvested. It consists of the systems in which nature and humanity interact.

The Challenge

Tomorrow's professionals are being trained today. In environmental and natural resource fields, the reservoir of minority students is still all too small. Just 6.6 percent of the physical science majors and 9.5 percent of the biological science majors who graduated from American colleges in 1976 were minority-group members. Among agricultural and natural resource majors, only 4.1 percent were minorities. More can be prepared and convinced to enter science fields.

"Far too many minority students have convinced themselves that they cannot succeed in math, chemistry and physics," says Dr. John Slaughter, Director of the National Science Foundation (and the first black to hold that position). Slaughter believes that "it is important . . . for minority students to realize that careers in science and technology represent some of the very best . . . opportunities." Although recognizing that confidence can derive from cultural history, he sums up his view in what he calls 'Slaughter's theorem': "Black studies is for white students, and math, chemistry and physics are for black students."*

How can more minority students be drawn into these fields? How should those already interested be encouraged? What special efforts are various educational institutions and others making, and what new ideas should be tried?

Because the problems of minority educational institutions and predominately white ("majority") schools are different, they will be discussed separately in sections II and III of this report. As we consider academic programs, recruitment and retention of students, and related subjects, however, let us not forget the basic links between minorities and environmental issues, the links of relevance that need to be more strongly forged and widely recognized.

*Interview in *The Black Collegian*, February/March 1981, p. 166.

II

Environmental and Resource Studies at Minority Colleges

Minority institutions include 100 historically black colleges, plus 40 newer predominately black schools, mostly community colleges. Majority Hispanic student bodies are found in all Puerto Rican institutions and at fifteen colleges on the mainland. Nine mainland institutions each enroll over 4,000 Hispanic students. Native American colleges number nearly 40, many of them sponsored by tribes. In addition to sciences taught at all schools, particular relevant programs are offered at a number. Institutions of each ethnic heritage will be discussed in turn.

BLACK INSTITUTIONS

The traditionally black institutions, as a group, tend to have less academic prestige in many quarters than some "white" colleges and major universities. Nevertheless, they measure up well against regional schools of similar sizes and resources, and play an important role in the education of black professionals. "White" colleges have a poorer record of retaining black students to graduation. Although only 18 percent of black students in higher education were enrolled in historically black colleges in 1975–76, 37 percent of the bachelor's degrees earned by blacks were from such colleges.* Black institutions are similarly responsible for a larger than proportionate share of the graduate and professional education of blacks.

The historically black institutions are not the best choice for all black students, but offer particular advantages for many. Despite increasing opportunities in majority universities, many bright black students choose black colleges. Of black PhDs in the sciences, more have earned their bachelor's degrees from black colleges than any other source. Black institutions also have an impressive record of remediating and educating students not served by other institutions—students with deficient academic preparation, and students from poor families. (Half of the freshmen in black institutions in 1976 had parental incomes of $8,000 or less.) Black students may get greater leadership experience on black campuses, and talented students often have more personal attention from professors who serve as mentors. Perhaps most important, students are not distracted or emotionally sapped by on-campus problems of race or racism, and are free to concentrate on studies.

In the environmental and natural resource fields, the role of black colleges includes educating students in traditional sciences and in more specific professional areas. Virtually all these institutions offer biology and chemistry majors. A number of schools have developed some offerings in natural resources or environmental science.

Some colleges sponsor Career Days under various formats which can introduce students to professional fields. In March 1980, for instance, Howard University hosted an all-day conference called "Environmental Careers/1980s" for 400 high school and college students, teachers and advisors.

Perhaps the most ambitious educational program is the new Center for Marine and Coastal Environmental Studies at *Hampton Institute.* Hampton's location provides a prime resource, on the James River estuary and Hampton Roads near the mouth of the Chesapeake Bay, close to extensive wetlands and saltwater marshes. The program's major components will be Instruction, Basic and Applied Research, and Extention Services. Hampton hopes to develop cooperation with a consortium of regional colleges having significant minority enrollment,

*National Advisory Committee on Black Higher Education and Black Colleges and Universities, *First Annual Report, 1977: Higher Education Equity: The Crisis of Appearance vs. Reality,* USDHEW/OE/NHCE, pp. 15 and 22. Other sources give other figures but the ratio of enrollment to graduation is similar.

Tuskegee Institute Pre-forestry Program

particularly to provide research facilities for faculty, but also to offer some shared programs for students. A seminar to introduce pre-college students to the field will help attract participants. The marine science major requires biology and chemistry each year plus various math and physics courses and a summer internship which will include a tour at sea on a research vessel. Services to Hampton's non-academic neighbors will include workshops on problems such as marine navigation, marine weather, and the seafood industry. The Center's program will be phased in over approximately five years.

The *University of Arkansas at Pine Bluff* is described by fishery educators at two majority institutions as "doing a whale of a good job" in fisheries. Pine Bluff has had some courses and considerable extention activities for a number of years, and last September initiated a four-year fisheries major. With excellent faculty and facilities for this program, it hopes to be able to recruit more students. Even before establishment of the major, its graduates have been heavily recruited. Pine Bluff is the only minority institution participating in CIFAD (Consortium for International Fisheries and Aquaculture Development), coordinated at Oregon State University under Sea Grant, which provides training and extension for developing countries. Dr. Les Torrans of Pine Bluff will be project leader for an aquaculture training project for Zaire.

The *University of Maryland-Eastern Shore* offers a B.S. in Environmental Studies and an M.S. and Ph.D. in its new Marine, Estuarine and Environmental Science Program. While based at Eastern Shore, this MEES graduate program is university-wide, enabling students to take courses at any University of Maryland campus.

Other examples come from a partial list of natural resource and environmental offerings at black institutions catalogued in early 1979 by Dr. Ronald Field, then of Tuskegee Institute. His findings point to a rather widespread interest in these fields, as black schools explore ways to prepare their students for America's occupational demands and environmental challenges.

Bachelor of science degrees in natural resources are available at *Lincoln University* in Missouri (since 1975) and *Delaware State College* (since 1967). Delaware State offers options in wildlife management and fisheries management, plus a minor in environmental sciences with some courses in aquatics and pollution. Wildlife management degree programs are beginning at *Southern University* of Louisiana and *Fort Valley State* in Georgia. The *University of the District of Columbia* has graduated more minority students in wildlife management than the larger program at Delaware State, where more of the wildlife students are white.

Fisheries biology or fisheries management courses, beyond those previously mentioned, are offered at *Southern University* (which also does research in aquaculture), and *Delaware State. Jackson State* in Mississippi carries on research and offers a M.S. in aquatic ecology, having initiated a series of marine biology courses in 1977. *Savannah State* has offerings in marine sciences.

A well-established pre-forestry program has been functioning at *Tuskegee Institute* for the past dozen years. Tuskegee's program is supported by the U.S. Forest Service, which provides personnel and other support, and by a council of advisors including representatives from major U.S. forest products corporations. The Weyerhaeuser Company and Foundation have provided substantial financial support, with additional funds coming from other companies. Annual summer jobs, mostly with the Forest Service or forest corporations, give students financial support and experience, though the quality of that experience ranges from mere manual labor to extensive exploration of the profession.

After two years or more of basic sciences, calculus, and introductory forestry courses at Tuskegee, students transfer to a university school of forestry for specialized courses. The University of Michigan has been the leader in this cooperative venture, but students have transferred to a number of other schools, recently including nearby Auburn University. Transfer to a large, "white," geographically distant school involves considerable culture shock for some students, and attrition has been high.

Black colleges also have a variety of offerings in environmental management and protection. *Howard University* expanded its former Home Economics Department to become a School of Human Ecology which includes a Department of Macroenvironmental and Population Studies. This department offers both a bachelor's and a master's degree in environmental science and policy. The Howard School of Engineering is reported to provide excellent training in environmental engineering in the Department of Civil Engineering.

Saint Augustine's College in Raleigh, North Carolina, is the only historically black institution to offer a B.S. in Occupational Safety and Health, a specialized option for chemistry majors. Roamless Hudson, who heads the Department of Chemistry, has had cooperation from the School of Public Health of the University of North Carolina at Chapel Hill in the development of Saint Augustine's program.

The National Association of State Universities and Land Grant Colleges reports that a bachelor's degree program in environmental studies has recently been added at *West Virginia State College*, historically a black school now with a majority white student body.

A directory of higher education in environmental protection fields, part of the National Environmental/Energy Workforce Assessment conducted for the EPA, inventories programs at all American institutions. Programs at historically black colleges listed in that directory are given in the chart below, to encourage institutions and employers with similar interests to find and cooperate with them.

Institution	Department or Division	Emphasis
Alabama A & M	Biology	pest management
	Nat. Res. & Env't Studies	plant protection
	Community Planning	land use planning
University of D.C.	Environmental Science	air pollution technology
		water pollution technology
		sanitary science technology
Florida A & M	Rural Development	entomology
		structural pest control
College of the Virgin Islands	Water Resources Research Center	marine and environmental science
	Caribbean Research Institute	
Mississippi Valley State	Biology	environmental health
Elizabeth City State	Geosciences	environmental science minor
Delaware State	Agriculture & Natural Resources	environmental minor
		environmental education workshop
Morehouse College	Urban Studies	urban land use planning

NATIVE AMERICAN INSTITUTIONS

Most predominantly Native American colleges are two-year institutions. Some have a history of support from church denominations or government, but quite a number are recently established by tribes or nations, sometimes with cooperation from community colleges in the state. Some have changed their names as they have become better established. Most are struggling institutions beset with financial problems. Their academic offerings tend to be severely limited, partly because students' preparation in reservation high schools is often poor, and preparation in the sciences and math is frequently abysmal.

The strength of these institutions is their responsiveness to the needs felt by their Native governing bodies. In much of the West, these needs include the expertise to manage Indian lands—forests, water resources, fisheries, range land and energy resources, with related concerns for environmental protection. And several Indian colleges have instituted courses in such subjects. Examples in 1977 included forestry or forest technology at *Nebraska Indian Community College* of Winnebago, Nebraska; at *Salish-Kootenai Community College,* Kallispell, Montana; and at *Ojibway College,* Baraga, Michigan, in cooperation with Michigan Tech. A natural resource program emphasizing rangelands was offered at the *College of Ganado* in Arizona. *Little Bighorn Community College* had a land reclamation workshop in cooperation with Argonne National Laboratories, and courses in related subjects. *Navajo Community College* at Tsaile has a similar Argonne land reclamation program.

The *Lummi College of Fisheries* in northwest Washington State has a unique program of fisheries science for seafood cultivation, which includes training staff and running the tribal aquaculture operation. Indians from 50 tribes, including some from as far as Maine, have attended the Lummi school.

Cooperation between these two-year programs and baccalaureate-granting schools of natural resources, paralleling the pre-forestry program at Tuskegee Institute or the WICHE exchange,* might encourage some students to start their college training in close-to-home Native American institutions and then transfer for more advanced professional education.

*Western Interstate Commission on Higher Education.

Important programs for natural resource training for Native Americans are established at Humboldt State University, University of Wisconsin-Stevens Point and Northland College in Wisconsin. Humboldt State's is described in Section III.

INSTITUTIONS WITH SIGNIFICANT HISPANIC ENROLLMENT

There are four small mainland Hispanic colleges, *i.e.,* institutions established specifically for Hispanic people, and eleven other mainland schools with over half the enrollment Hispanic. Most Hispanic students on the mainland attend majority institutions, but in a number of those there are significant concentrations of Hispanic students; nine institutions enroll over 4,000. As with Native Americans, a large proportion are in two-year colleges.

Of schools with significant Hispanic student enrollment, several have programs in environment or natural resources.

New Mexico Highlands University offers both an associate and a B.S. degree in environmental science, emphasizing a multi-disciplinary approach to understanding the environment, and the application of basic science and engineering for solving pollution problems. About 60 percent of the students in the program, as in the university as a whole, are Chicano. Located in a traditional Mexican-American area, Highlands benefits from the support of important, loyal alumni throughout the state, including its environmental science program director, Dr. Anthony Gallegos.

At *Texas A & I University,* which has 51 percent Hispanic enrollment, 35 to 40 percent of the undergraduates in the small range management and wildlife management programs are Mexican-Americans. They are heavily recruited upon graduation and get good jobs, says Dean Charles DeYoung. A side benefit of this recruiting is that employers are so pleased with the performance of these "affirmative action" recruits that the same employers return to Texas A & I for candidates of any ethnic background.

New Mexico State University for years has had substantial Hispanic participation, larger numbers although smaller percentages than either Highlands or Texas A & I. The College of Agriculture in fall 1980 enrolled 243 Chicano students or 18 percent of the College, in fish and game, forestry, soil conservation and other agricultural departments. Some introductory courses are offered in Spanish, partly to

benefit foreign students from Latin America. Interchanges with Mexican and other Latin universities are also common for faculty. When a Spanish language course designed for agricultural needs was offered a few years ago, about half the faculty took the course, many becoming proficient enough to function bilingually. The Agricultural Extension Service publishes monographs (in Spanish and English) on research concerning Chicanos, such as marketing in the lower Rio Grande Valley, and uses Spanish speaking students to do surveys.

In engineering fields, 640 students (28.2%) at New Mexico State are Mexican-Americans; figures do not show their special areas of concentration.

The *Center for Energy and Environment Research* of the *University of Puerto Rico* receives support from the U.S. Department of Energy. (Its Summer Science Student Program is mentioned in *Before College*, p. 23.) Although its main function is research, the Center trains some graduate students. Dr. Juan Bonnet, its director, says that half of the U.P.R. engineering graduates last year left Puerto Rico for the mainland, an example of the interrelationship of Puerto Rico with the rest of the United States. One professor has a considerable list of Center students who have participated in research and gone on to productive positions.

The University of Puerto Rico at Mayaguez is the site of the College of Agriculture, training some students in soil conservation and other skills.

Dean Roberto Algaze of the University of Puerto Rico Regional Colleges Administration makes an important point about mainland recruitment of educated Puerto Ricans. "Puerto Rico can supply professionals who can be role models in the U.S. and provide a multiplier by attracting more Hispanics to these jobs. But the mainland takes the cream of Puerto Ricans who go into science and engineering. This would be fine if you would exchange, sending other good scientists, engineers, and environmentalists to serve Puerto Rico's needs. The University especially needs an influx to keep it from being inbred." But that is not happening. And, he continues, "sometimes, I'm afraid, you don't want a Puerto Rican professional in order to get a role model who will influence other Hispanics to move into fields; you just want to fill a quota."

The National Environmental/Energy Workforce Assessment lists the following programs: A graduate program in radiation chemistry or physics is offered at the *University of Puerto Rico at Mayaquez*. Across the island, the University's Medical Science Campus has a Department of Environmental Health. A two-year environmental technology program is offered at the Aquadilla campus of the *Inter-American University of Puerto Rico*. On the mainland, *East Los Angeles College*, a two-year institution with 66 percent Hispanic enrollment, offers a concentration in Environmental Studies in its Department of Life Sciences.

Other universities having substantial Hispanic enrollment offer natural resource or environmental science courses. Statistics are elusive on the extent to which Hispanic students are taking these courses.

DEVELOPING STRONG BASIC CURRICULA

For many minority colleges, providing specific natural resource or environmental programs may be less important than concentration on quality courses in biology and chemistry. A strong major in one of these sciences can prepare a student for several career directions, and for graduate study in virtually all environmental or natural resource fields. The U.S. Environmental Protection Agency has been recruiting minority chemistry majors, and would hire biology majors but is now constrained by Federal red tape.

Dr. Shirley Malcom, Director of the Office of Opportunity in Science of the American Association for the Advancement of Science, suggests that biology departments in black institutions tend to offer only traditional or biomedically related courses. She urges the addition of field biology, ecology and behavior studies, which are inexpensive, and could perhaps even be taught by visiting staff from a zoo or wildlife preserve, or by the college's psychology department "rat runners." Thus students could learn about whole organisms as well as their component parts. Experience implies that research grants in resource or environmental subjects would stimulate interest in developing related course offerings.

Research grants awarded by the U.S. Environmental Protection Agency to minority colleges* have gone to departments of biology or sometimes chemistry. Under such grants Alabama A & M is in-

*Through the Minority Institution Research Support (MIRS) Program, Clyde Bishop, Director. This program was expanded to include institutions with significant minority enrollment, and thus better serve Hispanics. The MIRS Program is to be eliminated under President Reagan's new budget.

Tuskegee Institute Pre-forestry Program

vestigating the use of municipal sewage sludge for agricultural purposes; Savannah State is studying South Carolina wetlands for nutrient flows and effects of pesticides on selected species of plants and invertebrates; Howard University is researching effects of ozone on plant development; and several other institutions are evaluating, analyzing, or determining techniques for other problems.

Dr. Glenn Paulson offers to arrange access to the National Audubon Society's Wildlife Refuge system for minority faculty for field research, of short or long duration. Other organizations owning nature preserves could do the same.

Cooperative education agreements, allowing students to get work experience, some income, and perhaps a sense of direction for careers, have been signed by a number of predominantly minority colleges and the EPA, whether or not specific environmental science courses are offered at these schools. In November 1980, the Northeast Fisheries Center of the National Marine Fisheries Service held a two-day workshop for representatives of one Hispanic and 26 black colleges on the use of cooperative education arrangements. Dr. Bradford Brown of the Northeast Fisheries Center insists on some cooperative positions being designated for underclassmen, since there are so few minority fishery majors or graduate students. Thus minority science students are introduced to the field, and several have decided to become fishery scientists.

Dr. Malcolm of the AAAS suggests that the 3-2 dual degree pattern established for the study of engineering be set up also for environmental or resource degrees. After three years of study at a liberal arts college with solid science, math and English courses, a student transfers for two years at a college offering professional training, and earns a degree from each institution. Any number of minority colleges have arranged 3-2 programs with engineering schools; many should be equally able to arrange programs with schools of natural resources or environmental science.

The University of Michigan School of Natural Resources has had a cooperative program of this sort with liberal arts colleges for a number of years, but the arrangement with Tuskegee's pre-forestry program is the only agreement involving a minority school.

Another option would be to encourage summer school or exchange terms at a university for desired specialized courses, followed by return to graduate from the "home" school. Dr. Gilbert Bayne of the *University of North Carolina/Wilmington* has proposed a consortium on marine science and environment as part of which about 20 juniors or seniors from participating black colleges would take one term at UNC/W and then return to their own campuses. UNC/Wilmington would hope thereafter to attract some of these students for graduate study.

In cases where specialized classes can be taught through television and/or by correspondence, arrangements for such courses could be made available. Short term study away from a home school is attractive for students who want to maintain ties with an alma mater and graduate with their classmates.

Resource or environmental job placements for biology or chemistry majors would be enhanced if college placement officers were more familiar with the occupations and their educational requirements.

Many Federal agencies recruit regularly at minority colleges, but some state agencies and private employers merely include minority colleges on a mailing list. A form letter is better than no communication, but does not command much attention.

All in all, minority colleges are doing more in environmental and resource fields than is often recognized, even by them. With funding and cooperation from other institutions, they have the potential for considerably greater contribution.

III

Minority Students in Environmental and Resource Programs at Majority Institutions

Three quarters of the minority students in higher education are enrolled in majority institutions. Unfortunately, the percentage of these students earning baccalaureate degrees is much smaller than that for students in minority colleges. At the post-graduate level, nearly all education in environmental sciences and natural resources is offered at majority universities. Therefore, the responsiveness of these institutions to minority students will directly affect the numbers of minorities receiving advanced professional training.

Many professional schools and departments* of natural resources, environmental science, environmental health and the like, at both undergraduate and graduate levels, have established good records of preparing white students (including increasing proportions of white women), but few have been successful in attracting and retaining minority students.

CAMPUS-WIDE CONCERNS

Efforts of "white" institutions to enroll and retain more minority students have been studied and reported extensively. Excerpts from three studies are included in Appendix D. One concerns non-traditional traits for predicting academic success, which may be useful for admissions decisions. The second is from a 1979 study of the experience and attitudes of black students at seven major white universities. The third summarizes efforts of the College Board since the 1950s to improve services for minority students.

Over the past fifteen years, colleges and universities across America have established minority affairs offices to assist black, Hispanic, Indian, and Asian American students in a variety of ways. For academically ill-prepared students, developmental courses, tutoring services and classes in study techniques are provided. Financial aid officers may be assigned particularly for minority students. Personal counseling, by both professional psychologists and peer counselors, is widely available. Services to each other are provided when students of an ethnic group become numerous enough on a campus to establish a critical mass for peer support.

All these services are crucial, not for all minority students, but to respond to specific needs of some. Unfortunately, the quality of these services varies considerably from one institution to another, as does the depth of commitment of the university administration. Service elements may be fragmented by organization or location, by abrasive or weak personalities, or by struggles of institutional politics.

Recruitment to higher education is covered in *Before College,* pp. 38–44. Particular efforts for recruitment to environmental and natural resource programs are described in the next part of this section.

Support for Enrolled Students

Once minority students have enrolled, special attention must be given to retaining them. Retention rates are considered acceptable when the ratio of minority students enrolled to those graduated equals the ratio for white students. In many white institutions these rates are not achieved.

A whole battery of support systems—financial, academic, counseling and peer support—are necessary for two general reasons. First, many students have specific problems to overcome or adjustments to manage. Second, white institutions need to combat skepticism of their motivations among the many minority persons who suspect that institutions are more interested in counting minority students than in graduating them, *i.e.,* more interested in statistical appearances than in commitment.

*Sources for obtaining lists of schools offering accredited programs in environmental and resource fields are listed in Appendix C.

University faculty and staff wishing to eliminate barriers to minorities within their institutions must involve the minority students affected, both to identify problems and to design remedies.

Attitudes of whites. One element in support for enrolled minority students, perhaps the element hardest to pin down, is the attitude of white faculty and students toward minority students. The atmosphere in which a minority student must work can be distracting or discouraging. One black student told of entering a major university's forestry school despite the comment from an already enrolled acquaintance, "Try it, you'll hate it." His experience bore out her warning.

Repeatedly, minority graduates, as well as those unsuccessful in white colleges, mention problems of atmosphere. This does not imply that all faculty and students are openly racist, although damaging overt episodes still occur. More common is unspoken prejudice, suspicion, lack of interest, or stereotyping. Frequently white administrators and faculty make assumptions about all students based on experience with white students, generalize about all minority students from experience with a few black students, or draw inappropriate analogies between ethnic minority students and white women students.

A professor may be reluctant to give a minority student a candid assessment of problems in his or her work, for fear of appearing prejudiced—a reaction that has been described as "genteel racism." It may avoid conflict, but the disservice to students is based on their race.

In Dr. D.H. Smith's 1979 study, many black undergraduates on majority campuses referred to "the alleged belief of white faculty and students that all or most blacks were special admits . . . that classroom discussions and . . . research papers which speak of black issues are irrelevant."*

Faculty attitudes matter for several reasons. In classes small enough for personal contact, teacher expectation of success or failure has considerable effect on student performance. If a teacher believes a student is not very bright, that student's failure to understand a point confirms the teacher's estimate. But if a teacher believes a student is bright, a student's failure to understand the same point leads the teacher to assume that the explanation was faulty, and to try a new approach. The amount of time and patience a teacher will spend on explanations, particularly with students whose academic preparation may have been deficient, may well be influenced by unconscious estimates based on ethnic stereotyping.

In most schools, each student is assigned a faculty advisor to counsel him or her on academic and career concerns. The understanding and empathy a teacher brings to this task will influence both the usefulness of the advice and the student's willingness to accept it. In addition, observant faculty members and administrators can direct students to other resources on campus when needed. The selection of the advisor for each minority student should be based both on academic subject and on ability for true empathetic communication.

It has been stated that the atmosphere for minorities on white campuses is the same as in the working world, and that if students are to adapt realistically to working in "white" organizations they need practice at universities. The response must be twofold: first, that some students make that adjustment early in their lives, some while at college, and some after maturity has strengthened their self-confidence; and second, that "white" organizations in a heterogeneous nation may also have adjustments to make.

Counseling and peer support. Those minority students not already experienced in competetive white educational settings may need to develop attitudes and study habits conducive to success. In a study of Asian American and black mathematics students at the University of California, Uri Treisman discovered that the black students isolated themselves and seldom asked help from other students, whereas the Asian Americans studied together, benefiting from each other's comprehension. Black students tended to spend half as much time on homework as Asians, doing exactly what was assigned but no more.

Dr. Lillian McDermott of the University of Washington Physics Department teaches students from UW's Educational Opportunity Program who, she says, are bright and have high aspirations, but can't compete with high-aspiring whites, in part because they need to develop an outlook and acceptance of academic values to parallel that of their competitors. A support system is terribly important, she says, especially for the best of these students.

Academics. Let there be no misunderstanding; extensive consideration of the atmosphere in which minority students must operate cannot be a request for lower academic standards. The purpose of educational institutions, obviously, is to educate, and minority students undergo considerable stress in

*Donald Smith, "Admission and Retention Problems of Black Students at Seven Predominantly White Universities," *Metas* vol. 1, no. 2, p. 27. See also Appendix D.

order to acquire information and skills to equip them for careers. The problems of atmosphere are academic problems precisely because tensions can interfere with concentration on studies.

Conversely, academic success can buttress the self-confidence needed to withstand psychological pressures. Adjustments may be needed in the way subject matter is presented or in flexibility of scheduling the years of college. Among examples is Dr. McDermott's and Dr. Leonie Piternick's curriculum in physics and biology for University of Washington Educational Opportunity Program students. It features direct experience before discussion of concepts, and the development of reasoning and concept formation concurrently. Whatever the adjustments, the goal is to prepare minority professionals to participate equally in grappling with America's challenging environmental and resource problems.

Financial aid. Administrators' perceptions about the adequacy of financial aid for student grants vary considerably. Some administrators say that if only they could recruit minority students the financial sources are adequate to support them; others claim financial problems are a major reason for students leaving school. Such differences are based on judgments of how much and which forms of aid are necessary, as well as on differing resources.

Decreased federal funding will adversely affect opportunity for many students.

Many students from poor and middle-income families finish college heavily in debt from educational loans. Thus even after equal education they do not begin professional life on an equal basis with those from more affluent backgrounds. Insofar as possible, financial aid packages should be composed of grants and earned income far more than loans.

Graduate departments at Harvard several years ago agreed to dedicate part of the graduate school budget specifically for school-wide minority student fellowships. Thus minority students are assured financial aid and do not compete for departmental funds. Director of Student Affairs Suzanne Lipsky says it is impossible to overestimate the importance of this factor in encouraging graduate departments to admit minority students, since admission involves no cost to a departmental budget.

All support systems are important, and some are most appropriately provided by university-wide services. At several universities we have found inadequate contact between administrators of environmental or resource programs and campus-wide services for minority students.

University of Michigan School of Natural Resources

MINORITIES IN RESOURCE OR ENVIRONMENTAL DEPARTMENTS

Efforts by particular schools or departments to attract and support minority students (and related campus-wide efforts) may stimulate actions at other schools. For ease of organization these efforts are categorized as recruitment, support, and so on. But, as in ecology, everything is related to everything else. Recruitment of minority students depends partly on those students' perception of the atmosphere and support for students once they are enrolled. Retention in turn depends on having recruited academically prepared students whose expectations are realistic. In fact, success in higher education is so dependent on adequate pre-college schooling that earlier educational levels keep intruding into this report. Chemistry professor Peter McKinney, long active in minority recruitment for the Harvard Graduate School, says "If I had $100,000,000 for increasing the pool of minority scientists, I'd invest it all on teaching math at the pre-college level." Dr. Shirley Malcom of the AAAS calls for developing among minority youngsters an awareness of options available for those prepared in science and mathematics.

Recruitment

Most administrators of natural resource and environmental programs responding to Human Environment Center inquiries have stated that because minority enrollment is so small, the greatest need is recruitment.

The Center's first report on minority education for environmental and natural resource professions noted the problems in minority communities of limited information at home and at school concerning college and career choices. (*Before College,* pp. 27-28.) Special, aggressive outreach by colleges and universities is needed to inform minority students of career potentials and program offerings and to attract them to professional or graduate schools. Institutions should concentrate on direct contact with young people in groups or schools having high minority participation.

Under White House direction, in the summer of 1980 seven Federal agencies instituted a research apprenticeship program for minority high school science students. Under the Environmental Protection Agency program, 100 students worked in EPA research labs, learning about environmental science. At each location, the program was coordinated by an educational institution; for university programs involved, the contacts should prove fertile for recruitment. The largest programs were those at Cincinnati, Ohio, and Research Triangle Park, N.C., coordinated respectively by the University of Cincinnati and North Carolina Central University. Other universities connected with EPA's program were University of Wisconsin-Superior, University of West Florida, and Oklahoma's East Central University.

Specific recruitment efforts are being tried at a number of universities.

The *School of Natural Resources* of *Ohio State University* is instituting a general grass roots recruiting effort in every county of Ohio, with an emphasis on minority recruitment. In many counties minority high school biology teachers, community or church leaders and others are to be sent packets of information and the name of a local alumnus of the School as a source for more information. School of Natural Resources administrators will phone and, as funding permits, visit these representatives to further inform them so that they may encourage local minority students.

In the *State of Tennessee,* nearly 25,000 young people participate in 4-H Club wildlife projects and 9,000 in 4-H forestry projects. A fair number of those youths, particularly in Memphis, Nashville and Chattanooga, are black. A promising proposal to attract this group to natural resource professional education was developed by Dr. Jim Byford of the USDA cooperative extension unit at the University of Tennessee. The proposed project, awaiting modest funding, would identify black ninth and tenth graders in these 4-H programs, and provide special materials and support for local extension agents and volunteers to continue encouraging these students' interests.

An additional benefit for these students would be their eligibility to apply for 4-H college scholarships.

Colorado State University College of Forestry and Natural Resources recently took the sensible step of combining its minority recruitment with that of other science-related schools of CSU. Jim Volpa, who started as minority recruiter for the College of Natural Sciences in 1978-79, now also recruits for the College of Veterinary Medicine and Biomedical Sciences, which includes Environmental Health, and for Forestry and Natural Resources. He visits high school sophomore or junior science classes, urging students to study hard in math and science because the competition is real, and then describing a wide range of science and engineering professions open to those who are prepared. Students seem to take the message seriously; counselors in the same schools warmly welcome Volpa's return visits to recruit seniors for Colorado State. A conference for northern Colorado and Denver area school counselors last year, outlining minority underrepresentation in science and engineering, provided another useful set of contacts.

In October, CSU sponsored a two-day retreat at its forest camp for 20 to 30 minority high school and early college students. The U.S. Forest Service and Soil Conservation Service were co-sponsors, and campus groups El Centro Chicano, Native American Student Services and Upward Bound participated. Pre-retreat publicity announced the weekend as an opportunity to explore forestry and soil conservation careers that might be attractive to persons from science-related backgrounds. Activities included demonstrations in engineering and resource studies by Forest Service and Soil Conservation Service personnel, and discussions of university admissions, financial and other support, and academic programs at CSU. Volpa says interest was high. He anticipates five to ten applications from this effort.

Colorado State University also has a new program for Native Americans, whose director is find-

Colorado State University Forestry & Soil Conservation Retreat

ing considerable interest because of forest and range management needs on Indian lands.

Dr. Bertram Carnow, professor of environmental and occupational health sciences at the *University of Illinois School of Public Health,* considers the huge urban University of Illinois/Chicago Circle with its considerable minority enrollment a natural source of potential students. He lectures at Circle and other undergraduate schools in the area to stimulate interest. "We bring in high school students to the School of Public Health labs," he says. "You must go into the community and show that environmental problems are very relevant. In addition, the need for quantitative skills frightens people away. To get people into the pipeline, we've tried to set up tutoring programs to help with quantitative skills."

In another approach, Carnow has hired undergraduates to assist in environmental health sampling for research projects, giving these students a preview of environmental or occupational health concerns in the real world. Participation in research projects also develops their confidence in their ability to take on graduate study. Carnow says that of eleven residents this year in the University of Illinois School of Public Health, five are black. "We got these top notch students," he says, "by selling them on the importance of these skills for the communities they know."

The *University of California School of Public Health* for the past decade has had a special program for attracting and supporting Native Americans. The program has served 152 Indian MPH students, but most have been in health education or administrative fields; only six have earned degrees in environmental health sciences, four in epidemiology, and one in bio-statistics. Program director Elaine Walbroek attributes these small numbers to the paucity of Indian students with adequate college level science preparation for the science-based masters programs.

To encourage Native American students in undergraduate science-related studies, Walbroek and others have proposed a support program in the College of Natural Resources. Despite high priority from the university, this program has not been funded and thus is not yet able to recruit or provide services, though three Indian students are currently enrolled. The program is in the College of Natural Resources rather than the College of Letters and Science for two reasons. The smaller size and better

faculty-student ratio of the CNR means a student is less likely to become lost in the system. And some students are motivated to choose these fields because of the need for resource-related skills among Native peoples. A student doing well in lower division science background courses has a variety of potential options for further study in Natural Resources or other colleges.

Support for Enrolled Students

Because natural resource and environmental departments have so few minority students, particular attention must be paid to retaining those students who do enroll, both to help them succeed and to stimulate increasing applications from their acquaintances.

At a September 1980 conference at the *University of Michigan School of Natural Resources* on increasing minority recruitment, participants emphasized the importance of retention as one crucial element in the School's ability to recruit. Conferees recommended the development of data on dropouts, including a comparison with retention statistics for other schools at the University of Michigan, in order to identify problem areas. Feelings of isolation among minority students were noted, including vocabulary differences and lack of awareness of university resources that students can use. Recommendations included establishment of a buddy system, with each new student assigned an experienced student who would talk informally on a regular basis. Sensitive counselling based on active outreach to students should be instituted. Closer faculty-student contact was advocated. Particularly in a big, impersonal institution, the conferees felt, the burden of making contact should be on those who already know their way around, not on newcomers or those experiencing difficulty.

Funding. Universities have some options of using scholarship funds for resource or environmental fields. For instance, the U.S. Education Department's Graduate and Professional Opportunity Program (G*POP) provides fellowships to minorities and women for graduate study in fields in which they are traditionally underrepresented. Universities identify these fields. Examples include the University of Texas-Dallas G*POP fellowships in geosciences and environmental science, and the University of Washington fellowships in fisheries, forest resources and oceanography.

Some relevant sources of information for minority students on financial aid in these fields are listed in the bibliography of this report. Increased financial help could surely improve students' access to environmental and resource education.

An even more compelling need is financial support for institutions' programs. References to promising but unfunded proposals are scattered through these pages.

Short Courses

Schools or departments might well consider short courses to provide specialty training for minority professionals in related fields. Biology teachers, or those working in a medical laboratory, for example, might be prepared for environmental or natural resource work through a series of two-week seminars or an intensive summer school.

Dr. Dade Moeller, Chairman of the Department of Environmental Health Sciences at the Harvard School of Public Health, recommends this avenue, pointing out that over 2,400 environmental health short courses were offered in the U.S. from 1977 to 1979. Minority employees of the U.S. Fish and Wildlife Service and other agencies who had their B.S. in biology have become certified in fisheries or wildlife biology after attending the Tennessee Tech summer program described below.

Graduate School

Graduate education in science, as in other fields, often depends on a particularly personal relationship with one professor. Admission may hinge on recommendations and the willingness of a professor to accept a candidate. Support for a student in research and through his or her thesis may depend on the interest of the mentor professor.

Recruitment. Academic graduate departments and small professions have recruitment problems which are quite different from those of broad professions like law or medicine. Since fields are so disparate, one recruiter cannot explain them all.

Eight eastern graduate schools sponsor an annual conference for minority college underclassmen to introduce graduate study options in arts, sciences and engineering. (see *Before College*, p. 42.) Workshops on specific disciplines, led by minority faculty or graduate students, explain the fields and subsequent employment opportunities, and outline what is realistic to expect as to admission for graduate study and financial support. The conference provides an unusual opportunity for college students to see minority role models in academic fields of their interest. It also benefits participating staff, who can

feel their impact on a significant number of minority students, and who appreciate meeting their counterparts from other universities.

In the Midwest, the CIC institutions (the Big Ten plus the University of Chicago) sponsor a similar conference. Western universities have also held one. The model works and should be much more widely established.

Admissions to graduate school are virtually all decided by individual departments.

Dr. Peter McKinney of the Harvard Graduate School of Arts and Sciences says, "A department may or may not be interested in minority entry, and is usually very conservative about what are appropriate credentials for entry. We must develop an advocate for minority candidates on each department's admissions committee." The Harvard Graduate School developed a technique McKinney considers fairly successful. "After original admissions decisions are made, the dean's office takes all applications of minority candidates who were turned down but who seem potentially admissible. The applications, with the identity of candidates not revealed, are read by the admissions committee chairmen from all departments sitting around a table."

"Invariably," says McKinney, "the English Department committee head asks why this physics candidate wasn't admitted despite seeming so qualified, and the Physics Department would have admitted 'x' who applied to the English Department. That is, each department has a very narrow view of who is qualified. This technique has opened each other's views on application criteria. People should be pressed to defend the choices they have made, among colleagues and among those who have a somewhat different view of admissions criteria," he concludes. Suzanne Lipsky believes this technique has, over the years, resulted in more informed discussions within admissions committees, though some candidates are still denied admission who she thinks could be successful.

Dr. Bradford Brown of the National Marine Fisheries Service points out that in many graduate schools, especially in science, admissions is personal. If a professor agrees to take on a student, he or she is accepted into the department. "A student with a high GRE, high grades at Prestige U and good recommendations walks right in. If a student is more marginal, then recommendations become much more important. So there is a need to develop contacts with undergraduate faculty, for instance in some black colleges." Brown also believes that good recommendations are one benefit of research work-study programs such as his. "We personally have gotten some minority students into grad school because we can say to graduate professors we know, 'This student did excellent work for us and shows promise for research.' This is very important," he says. Unfortunately, "the ordinary minority student does not have that kind of backing."

Dr. Arthur Sacks of the Institute for Environmental Studies at the University of Wisconsin-Madison concurs. Admissions decisions are by consensus. "I've never seen a vote. Any time a faculty member says, 'I'll take this student,' he or she is admitted. The same happens if a professor says, 'I know John Doe at Woods Hole who recommends this student highly.' "

Support. A graduate student's ability to do successful research and finish a thesis also depend considerably on relations with his/her major professor. In a graduate school science department there is usually only one specialist doing the particular kind of research to which student's work relates. Brad Brown says, "As long as he maintains a B average in courses, I can graduate any student of mine. Similarly, if I dislike a student, I can make life miserable, and probably push him out."

Financial support for graduate students is a normal obligation of graduate departments. Special grants for minority students are useful for getting students started during their first year or so of course work, particularly if full-time concentration on studies is needed. In fact, an available grant for a minority candidate may be a deciding factor in a department's admission of an otherwise marginal candidate. But graduate departments have an obligation to provide research grant support for minority students just as they expect to for whites. Minority students are already quite isolated in a "white" graduate school, points out Arthur Sacks. Financial aid that does not involve them in research increases that isolation. Furthermore, it is research and the resulting professional contacts that shape one's professional reputation.

Subjects for Research and Courses

As indicated in the Foreword, academic research in areas of particular relevance to minority groups not only is much needed, but also may help attract and nurture interests of minority students.

At Ohio State University's School of Natural Resources, one course in the Parks Division, "Urban Parks and Recreation Management," takes place in the City of Columbus, whose city parks director has

been very cooperative. The Environmental Education Division offers "Interpretation/Educational Program Development in an Urban Setting," in which students go into a ghetto neighborhood to set up a program, with community residents' cooperation.

The professional education of the students is much enhanced by working with citizens who know their own neighborhood, its need and resources. The City of Columbus so esteems the woman who teaches this class that a minipark has been named for her.

Urban forestry is receiving increasing attention. Urban fishing ought to, for its recreation value and for family food.

Dr. Bertram Carnow of the University of Illinois, doing research on health effects of air pollution, notes that 12 percent of black males have a genetic deficiency of an enzyme which is destroyed by ozone. "In Chicago we build all our housing projects along the expressway, exposing the residents to the highest level of ozone," he points out. "We studied an air pollution episode in Chicago, and found an excess of deaths from heart and lung disease. Most of those deaths were among blacks, black women with high blood pressure, black males with heart disease."

A study several years ago of forestry assistance to rural black landowners in Missouri by Ralph Didricksen of the Forest Service and Lincoln University is another example of minority-relevant research. The study found that these farmers were receiving a large number of services from other Federal and state agriculture programs but little aid in managing their small woodlots. The report concludes, "As a result of contacts made under this program, 62 additional requests for forestry assistance were received."

Examples of Programs within Majority Universities

Programs for natural resource training for Native Americans, run by Native Americans, have been established at the *University of Wisconsin–Stevens Point* and at Humboldt State University in Arcata, California.

Of 2,000 College of Natural Resources students enrolled at Stevens Point, about 20 are Native Americans participating in Natural Resources Career Education for American Indians, a program started in 1976. Before establishment of this program, only two Indians had graduated from the CNR.

The *Humboldt State* program, *Native American Career Education in Natural Resources* (NACENR), devotes much time and effort to recruitment. (See *Before College,* pp. 33 and 44.) Under an open admission policy established especially for this program, director David Jackson makes the decisive judgment on whether a student is likely to survive the rigors of a resources major, a very useful option given the problems of traditional tests for predicting success of non-traditional students. Jackson exercises this option with care, recognizing that failure can be more damaging to a student—and to the program's reputation—than denial of admission. Sometimes admission is contingent upon further preparation at a home community college.

Support services include an Indian counselor assigned to the program. Arrangements can be made for tutoring, and for preparatory courses at the community college in Arcata. The support provided by the peer group of other Indian students may be the most helpful of all.

The program supports Indians in all majors in the School of Natural Resources—forestry, oceanography, fisheries, wildlife, watershed or range management, resource planning and interpretation. NACENR students are expected to participate in Humboidt State's cooperative education program, being placed with the U.S. Forest Service, Park Service, Fish and Wildlife Service and other governmental and private employers. The on-the-job experience is a highly valued aspect of the natural resource education.

Nine special courses have particular relevance for Indian students. The introductory NACENR course examines issues facing the manager of Native American resources, including tribal and allottee politics. Other courses include Native American Water Rights, Native American Fishing and Wildlife Rights, and Cultural and Environmental Interpretation of Native American Resources.

Tennessee Technological University and the *U.S. Fish & Wildlife Service* run a joint project, now in its seventh year, which provides quite a different example. They have established a summer program, the Career Awareness Institute, especially for minority and women students seeking to add fishery or wildlife course work to their general biology-major backgrounds. Two sessions are held each summer, open to college seniors or graduates but designed particularly for sophomores or juniors to expand their awareness of career options. Participants earn 11 quarter hours of credit per session.

U.S. Fish & Wildlife Service.

Students come from many parts of the country, with the majority from traditionally black colleges in the South. The Institute provides courses not available at these home colleges. In recent summers some participants have come from a different source—minority Fish & Wildlife employees who need specific course credits for certification as fish or wildlife biologists.

The Career Awareness Institute takes place in conjunction with the Tech Aqua Biological Station summer school, open to all students, which offers courses such as limnology, plant ecology, and ichthyology for undergraduate or graduate credit. Career Awareness students take one such course and a one-credit seminar through Tech Aqua. They also take one course provided by the Career Awareness Institute, either Introduction to Game Management or Introduction to Fish Management.

The Institute also runs a seminar and field trip series which includes presentations by a number of minority professionals practicing in fish or wildlife fields, who often devote extra time to visiting with students. Field trips have included banding ducks at TVA's Land between the Lakes and visits with game researchers tracking transmitter-fitted bears or wild boar in the Great Smokies.

The Career Awareness Institute pays moderate travel costs, tuition, fees, books, board and room for its students. While originally funding came from the Fish and Wildlife Service and TVA, Tennessee Tech has increased its contribution from merely housing the program to being the major funding source.

Graduate departments of fish and wildlife should regard these students as excellent candidates for recruitment, says Dr. Don Estes, originator of the Institute and still at the Cooperative Fisheries Research Unit at Tennessee Tech. A number are academically talented and his experience indicates the value of "taking a chance" on admission of some others, Estes says, even if they need remedial study and special financial aid before assuming research-assistant roles. The Graduate Record Exam may be an inappropriate tool to measure potential success, Estes says. "Personality, motivation and a lot of other factors matter" in the career of a fishery or wildlife biologist.

Some colleges have run into frustrations that underscore the need for patience and persistence. For instance, *North Carolina University's School of Forest Resources* for three years has run a three-day summer program for 15 to 20 high school students patterned after that of the NCSU School of Engineering and School of Design. Unfortunately the effort has been more expensive than useful in recruiting forestry students, because of an inability to attract high school students sufficiently prepared in science and math.

North Carolina State has a campus-wide program to improve its image in the local black community of Raleigh. Dean Saylor of the School of Forest Resources has spoken to local black groups as part of this effort, and says audiences are receptive and respond along the line of "Gee, I never knew . . . ." So far, however, no students have enrolled as a result of this effort. Dean Saylor sums up these and other recruitment activities as "tremendous effort, terrible results."

For whatever reason, though, minority students are beginning to enroll at NCSU. Fall 1980 statistics show six blacks majoring in forestry, eight in recreation, ten in pulp and paper science and two in wood science and technology. The demanding pulp and paper science major is basically a chemical engineering specialty, whose graduates receive the highest starting salaries of any from NCSU. These 26 black students make up only 3½ percent of the School of Forest Resources enrollment, still far too small for equitable representation. But both the numbers and the percent are larger than at many other forestry schools.

IV

Action by Other Organizations

One theme stressed by most practitioners is the necessity for cooperation among many interests, from professional societies to potential employers. Here are some examples of groups outside universities working with or for minority college students.

Professional Societies

The *American Association for the Advancement of Science* is the only major scientific professional society with paid professional staff working on equal opportunity. In addition to its projects on women and the handicapped in science, the AAAS Office of Opportunities in Science works with minority scientists and their organizations on problems of minority underrepresentation in science, and has initiated a network of minority women scientists. Through the minority scientists teaching in colleges and universities, this office can have considerable effect on higher education of minority students.

A number of professional societies have committees on minorities, some of whose projects relate directly to higher education. The *American Society of Biological Chemists* sponsors biochemists as visiting lecturers on black campuses. The *American Geological Institute's* Minority Participation Project provides about 60 scholarships per year to minority geoscience majors. The *American Society for Landscape Architects* five years ago developed a plan for minority students to explore landscape architecture careers (see *Before College,* p. 34), which called for continuing personal contact as a student progressed through his or her education.

Minority professional associations often have student chapters or student outreach programs. Student chapters of SSEPA (*Society of Spanish Engineers, Planners and Architects*) at a number of New York and New Jersey universities provide valuable peer support for Hispanic physical science and technology students, who cooperate to help each other overcome academic or personal difficulties. The *Society for the Advancement of Chicanos and Native Americans in Science* (SACNAS) works to interest Indian and Chicano youth in science and promote financial aid for students, as well as supporting practicing professionals. Half the chapters of the *National Technical Association,* a primarily black organization, are student chapters. Other minority professional societies are listed in the AAAS "Association of/for Scientists of Racial/Ethnic Minority Groups."

Minority Organizations

Minority organizations can be involved in higher education efforts related to these fields. *NAFEO,* the National Association for Equal Opportunity in Higher Education, was coordinator of the workshops on cooperative education for minority colleges and the National Marine Fisheries Service (see p. 8). At its large annual conference on Blacks in Higher Education, NAFEO holds a session on professions used by the U.S. Department of Agriculture, a session on science education, and other sessions relevant to training environmental and resource professionals.

The *Urban League* sponsors both national and local career awareness efforts.

The National Urban League's Education and Career Development cluster includes several programs on minority higher education which could be used in fields of our interest. The Faculty Career and Curriculum Development Program, encompassing Summer Fellowships and Career Awareness Conferences, informs minority students, educators and administrators about diverse professional career opportunities. Summer Fellowships place minority institution faculty members in industry and government to obtain practical understanding of their fields. Some 25 League Career Awareness Conferences were held in a recent year at minority institutions across the country. Each one brings as many as 100 career consultants to a minority cam-

pus, visiting classrooms in teams. Some consultants recruit students for their own employers before or after these conferences.

The League's Black Executive Exchange Program (BEEP) provides business and professional "Visiting Professors" to traditionally black colleges and universities. Visiting lecturers are black, both men and women, and they become role models for inexperienced students. During the 1979-80 academic year, approximately 400 "BEEPers" served at 39 colleges. BEEP also conducts career awareness sessions and other projects.

The Tri-State Minority Faculty Program studies hiring, promotion and tenure patterns and minority student retention in New York, New Jersey and Connecticut universities.

Among the 117 Urban League affiliates across the country, career awareness counseling for minority youth is provided in more than 50 programs.

Career awareness and scholarship efforts are supported by a number of black sororities and fraternities as well as by minority professional organizations. Local chapters of Delta Sigma Theta and Alpha Kappa Alpha sororities sponsor career days, and Omega Psi Phi fraternity offers scholarships, to cite three examples.

Aspira, mentioned in *Before College* for its high school programs, supports research on education and Hispanic youth through its Center for Educational Equity.

The *League of United Latin American Citizens* (LULAC) established LULAC National Education Service Centers to provide counseling services, scholarships, research and advocacy for Hispanic students. The LULAC National Scholarship Fund provides about 450 scholarships per year.

Environmental Organizations

Environmental organizations tend to have white, middle class memberships and staffs (staff often being underpaid and recruited from member volunteers). Nevertheless, they include a number of individuals who have interest and/or experience with minority concerns. Some of these organizations are cooperating with urban or minority groups or addressing their issues. More could do so.

These organizations can also influence the education of minority students in these fields, particularly through their use of college students as interns. Environmental intern positions include some paid directly or under arrangements like College Work-Study, some volunteer, and some with potential for earning college credit. Minority students would benefit from working for *Environmental Action, Environmental Defense Fund, National Wildlife Federation, Natural Resources Defense Council, Sierra Club,* and other organizations. There is every indication that such organizations would welcome minority interns and be enriched by their participation. "A Resource Guide for Health Science Students," available from the National Institute for Occupational Safety and Health, lists many groups and reports their interest in student volunteers or interns. Students should approach groups directly, as many organizations have changing needs.

Four regional *Environmental Intern Programs* arrange paid summer internships with corporate, public and other employers in the Northeast, Lower Great Lakes, California, and Pacific Northwest regions. Coordination is provided by the Center for Environmental Intern Programs, whose assistant director, Susan Hunnewell, is working to increase participation by minority students.

Thompson's Island Education Center in Boston offers internships and would like to arrange to provide the practicum for environmental education teacher training. Since Thompson's Island serves large numbers of minority children, participation by minority college students is particularly valuable.

Higher education institutions themselves can also benefit from cooperation with environmental organizations, and vice versa. Access to natural preserves of *National Audubon Society, Nature Conservancy,* and other organizations for minority faculty and student research has been suggested.

Industry

Corporations have contributed to higher education of minority students in these fields in a number of ways. Support from forest products industries for Tuskegee pre-forestry students was noted in Section II. The Weyerhaeuser Company Foundation has provided major support for that program and other efforts, including a compilation of statistics on women and minority students in fields of interest to forest industries. International Paper Company underwrote a recruitment film for the Native American Career Education in Natural Resources Program at Humboldt State University.

Individual employees have also organized useful efforts. A Weyerhaeuser Company manager set up several career seminars for junior high school students in North Carolina. A Crown Zellerbach manager was involved in a creative program for minority youngsters in Portland, Oregon; numerous other examples could be cited.

Visits to campuses by corporate representatives provide additional means of contact with minority students. Recruitment visits arranged through college placement offices are not the only technique. Crown Zellerbach cites the Forestry Research Seminar Series it gives on six major campuses, plus periodic lectures at other schools, as providing an important opportunity to meet minority and women forestry students.

Temporary employment of college students, during summers or through cooperative education placements, are the most direct influence. Summer employment, as mentioned for the Tuskegee program, is available to students from most colleges. The best employment programs for introducing students to careers are carefully designed for that purpose. They include orientation, rotating assignments, and even some evening seminars. Weyerhaeuser's Summer Intern program (for all races) is a good example.

Industry provided all the "experience" assignments in cooperative education when that concept was first established for engineering. "Coop ed" has grown to cover many other disciplines and public as well as private employers. In environmental and resource fields, much more information is available on placements in governmental agencies than in industry.

One problem in attracting corporate attention to education in natural resources is that, except for the forest products industry, renewable resource management requires only a small proportion of total employment, and thus attracts little attention. Marine biologists hired by offshore oil drillers or land and wildlife managers employed by owners of extensive mineral lands are examples. Nevertheless, these corporations should participate to some extent in the educational process, perhaps as part of general support for minority students.

Pollution control and occupational health concerns call for increasing employment of experts. In new or expanding fields particularly, it is appropriate for industry to tap minority and other non-traditional workforce pools and to support professional education.

Government

From the federal level, higher education of minority students in sciences is influenced directly through the Department of Education, National Science Foundation, National Institutes of Health, the Department of Agriculture's connections with Land Grant Colleges, and innumerable other agencies and programs that provide funding for students, programs and research, and that recruit new federal employees in natural resource fields.

U.S. Fish & Wildlife Service

State governments are similarly involved with funding, most directly of state supported universities, and employee recruitment.

Funding. Federal programs like the Basic and Supplemental Educational Opportunity Grants (BEOG and SEOG) and other general financial aid have been essential in increasing the numbers of minority students able to attend college. Support for special subject study, as in biomedical fields, or advanced degrees, as by NSF's Minority Graduate Fellowships, has greatly improved access to those areas.

Support for programs and research has come through grants and through cooperative efforts of government offices, such as at Tennessee Tech. Since grant funding is "soft money" (often of short duration and unpredictable renewal), institutions are not as able to plan long-term efforts as they should be.

Whereas various other Western nations support universities as free public education, the United States, with its diversity of colleges, can support students or programs directly, and thus the institutions indirectly.

Recruiting new employees. A number of government agencies wishing to hire minority professionals have encouraged their preparation, particularly through cooperative education placements and summer jobs. Because of federal personnel proce-

dures, federal managers find cooperative education an important avenue for hiring minority employees, as well as an excellent means of developing interest in their agencies and providing students direction for future choices of course work.

The State of California's summer student employment program provides significant opportunities for minority, women and disabled Californians. Seasonal employees provide a pool of candidates for permanent positions; in several departments half of the permanent entry-level positions are filled by people who have had previous seasonal experience in the department.

Student awareness of non-traditional careers has been enhanced by efforts such as the Department of Agriculture's series of career conferences on black campuses. The University Affairs Staff of USDA's Office of Equal Opportunity conducted these outreach seminars at Southern University, Tennessee State, Prairie View and North Carolina A & T in 1979. Employment recruiters visiting colleges can help alert younger students to the courses they should take to enhance their employability.

Other personal contacts with students can encourage them in non-traditional careers. Agency scientists in extension units attached to universities sometimes have considerable contact with and influence over students. More distantly located professionals may serve as adjunct professors, *e.g.* at minority colleges, lecturing from time to time.

Federal relations with colleges also have been strengthened through Intergovernmental Personnel Agreements (IPAs) under which faculty members have taken temporary positions in government or officials have moved temporarily to work at an institution.

V

Recommendations

Action on many fronts will be necessary if we are to reach the goal of truly equal access to environmental and natural resource professions. As a nation we must strive for broad-based goals, and as individuals or institutions, we should undertake particular tasks.

BROAD-SCALE ACTION RECOMMENDED

Consultants convened by the Human Environment Center in October 1980 (see Appendix A) recommended actions on several levels to increase minority persons' access to these professions. The underlying theme of their recommendations was the need for more contact and cooperation.

1. *A national committee or council* on minority entry into environmental and natural resource professions should be established *to bring visibility to this issue* and *to recommend and instigate new initiatives* in many quarters.
2. *Regional and special subject consortia* should be established to respond to opportunities and problems in particular geographic areas and professional fields.
3. *Environmental and natural resource interests should work in common with education, engineering, biomedical and other interests for improved pre-college mathematics and science education* for minority students.

Each of these recommendations is endorsed by the Human Environment Center, which adds details and further recommendations in this report.

A national council should bring visibility to this issue and recommend and instigate initiatives.

The advantage of coordinated national initiatives is illustrated by efforts in engineering. A committee on environmental fields might be modeled on the National Research Council's Committee on Minorities in Engineering. A national committee or council should include representation from a broad range of interests: public school systems, two- and four-year colleges, universities, professional societies, industry, government, and minority and environmental organizations. Supporting staff should serve as a clearinghouse of information on means of presenting career choices to prospective students, training programs that serve minority students, special projects in educational institutions and other organizations, information directing university recruiters to pre-college programs that serve potential candidates, and related subjects.

The national committee and staff should direct attention both to the environmental concerns of minority communities and to career paths to the relevant professions.

Regional consortia should bring together high school, college, graduate school and employment interests.

The second recommendation calls for regional and special subject consortia. A regional consortium of educational institutions and public and private employers could help students qualify for environmental and natural resource training and widen their awareness of career options. Consortium efforts could coordinate and connect high school programs, college and graduate education and career placement. The pre-college outreach of such a consortium could cooperate with existing minority enlistment efforts in the engineering or health fields, which also depend on strong science and math preparation. Consortium-arranged youth experience in forestry, fisheries or newer environmental fields, whether in temporary job assignments or in academic research, will facilitate career decisions.

Such a consortium could serve a single metropoli-

tan center, such as Chicago, or several states, depending on the numbers of institutions and students concerned. For greatest benefit, regional consortia need connections with each other.

Consortia of special subject interests should be established.

A special-subject consortium, of institutions in one professional field, need not be geographically limited, may be particularly appropriate for graduate-level schools, and can benefit from experience of such consortia as the Council for Opportunity in Graduate Study in Management (COGME) which has fellowships for minority students, and the National Consortium for Graduate Degrees for Minorities in Engineering (GEM).

A well organized consortium in one region or field could provide a model for other regions and professions.

National leadership should stress improved pre-college science, math and English education.

Pre-college science, mathematics and English preparation must be strengthened for most minority students. Inner-city and rural schools are short-changing many minority students with inadequate education; students are cheating themselves by not taking advantage of the courses available. Black science educators at National Association for Equal Opportunity in Higher Education conferences have repeatedly deplored the minimal science and mathematics graduation requirements of present-day schools. College educators in engineering, health, and other science fields, as well as environmental and resource disciplines, agree that minority recruitment is restricted by inadequate science and mathematics preparation. Therefore, major efforts should be directed to teaching elementary and secondary students concepts and reasoning in these subjects. Such efforts need national leadership, perhaps spearheaded by the President's Science Advisor or a major science or education organization. Higher education interests in all science-based fields must actively participate.

Of these three major recommendations, the second, consortium building, may be most amenable to efforts by individuals. Increased regular contacts and cooperation can benefit both minority and majority institutions interested in enlisting minority participation in these fields. Cooperation through a consortium allows organized division of responsibilities, but informal on-going contacts are very useful even when not within a consortium structure.

RECOMMENDATIONS TO PARTICULAR INTERESTS

Suggestions on carrying out these recommendations are stated or implied throughout this report. They could almost be stated as a series of check lists for professionals in various settings.

All persons and groups, of course, must develop or choose actions that fit their circumstances. But the examples cited, Hampton Institute's marine center, SSEPA's student peer support, Tennessee Tech's summer institute and all the rest, may point the way to some new solutions.

Colorado State University Science Motivation Program

Pre-college educators should emphasize math and science.

Teachers, guidance counselors and administrators should encourage many more minority students to take (and take seriously) college-preparatory mathematics and science courses throughout high school. Some educators even believe four years of science and math should be required of all students. Opportunities should be provided for students to learn about non-traditional careers and the educational preparation required. School staff and administrators can work with practitioners in professions and with educators at institutions of higher learning to make information efforts more effective.

Minority colleges should concentrate on strong basic curricula and cooperate with other institutions.

Black, Hispanic, and Native American colleges are hard pressed financially and make heavy demands on faculty and staff. By and large, most minority institutions should concentrate on strengthening basic mathematics and science rather than attempt to undertake new programs in natural resource or environmental fields. They can offer experiential courses to prepare students lacking adequate background for college courses. They can emphasize excellence. In many instances, however, one or more new subjects, such as field biology or animal behavior courses as suggested by Dr. Malcom, could be useful. Only a few schools should expect to provide specialized programs.

Dr. Frederic Humphrey, distinguished scientist and president of Tennessee State University, recommends that colleges persuade more of their underclassmen to major in the sciences. He urges faculty members to spend more time on out-of-class instruction and encouragement of students, to infect them with enthusiasm and confidence in dealing with science.

Cooperative efforts with other institutions are the most promising path for enriching course offerings. Schools can share facilities, faculty, information and encouragement. Summer school, exchange terms or workshops on other campuses can broaden opportunities.

Different sorts of cooperation are exemplified in dual degree programs, for which a student leaves the minority institution after three years. Most dual degree programs have been in engineering; they should also be established in environmental and natural resource fields. Cooperation between institutions also facilitates transfers from a two-year college to a baccalaureate program.

Faculty members can improve their students' access to graduate schools by strengthening professional acquaintances with graduate school professors, for instance through participation in mainline professional societies. Knowing each other enhances the usefulness of recommendations for appropriate students. If graduate professors respect the professional ability and judgment of students' references, the recommendations will carry major weight.

Majority university environmental and resource programs should cooperate with campus efforts for minority students, increase contacts with minority institutions and organizations, and focus on issues of minority concern.

Cooperation is again the key to successful minority student recruitment and retention in majority university programs. Cooperation among all efforts serving minority students of a given campus will strengthen each. Many white faculty and students need to become aware of minority concerns. Most white educators in environmental and natural resource fields need to increase their contacts with minority communities as well as minority colleges. Organizations and institutions with strong minority participation are potential sources for recruiting minority students. And interaction with minority leaders can focus attention on issues of concern to those communities and generate relevant university research and teaching.

Cooperation for recruitment of students could well be modeled after existing graduate school information conferences. Short courses for upgrading or specialty training of minorities working in related areas can be offered by individual schools or through cooperative efforts.

Other organizations and agencies should increase contacts with each other, provide introductory employment, and support university projects and students.

Professional societies should strengthen minority affairs committees. Advice based on experience in similar associations is available from the AAAS Office of Opportunities in Science. Through a minority committee or other focus, professional societies can arrange personal contact between minority students and professionals as mentors, lec-

turers, or career resource persons. Societies can aid minority institutions with lectureships, program planning assistance, complimentary journal subscriptions, fundraising and other efforts.

Minority organizations can expand their student career awareness efforts to include environmental and natural resource professions. In fact, becoming more informed about environmental and resource management needs in their own communities could well lead to greater minority involvement.

Environmental organizations can act more often and more visibly on issues affecting minority communities, which include some of the most degraded environments in America. In so doing they will be most effective if they join forces with minority community organizations. Their most immediate support for education of minority students in these fields may be through enhanced efforts to attract minorities for internships. They should also increase cooperation with minority institutions through the same means listed for professional organizations. For instance, they could arrange to provide their publications to underfunded minority college libraries.

Industry similarly could support well-designed summer employment of minority students in fields related to corporate needs. Financial support should be provided for selected projects or products. Products could include brochures and audio-visuals explaining these careers and showing role models at work. Projects could include career awareness days or "shadowing" of a professional, conferences of educators and professionals to coordinate efforts, studies of needs and human resources, season-long internships and many other proposals.

Government should make predictable, substantial funding available for programs and student support. For nearly all minority students financial aid is essential to acquiring a college education. Colleges and universities, in turn, depend on external sources of tuition support for numbers of their students. Private donations are important, but because of the sums involved government funding must remain a major source.

Money for program support is at least equally important. Programs are needed to encourage student progression from initial exploration of career potentials through higher education to placement in career positions. Support systems and developmental courses for minority students in college will considerably increase chances for success. Staff time and expenses must be paid for, and must be funded on a predictable basis.

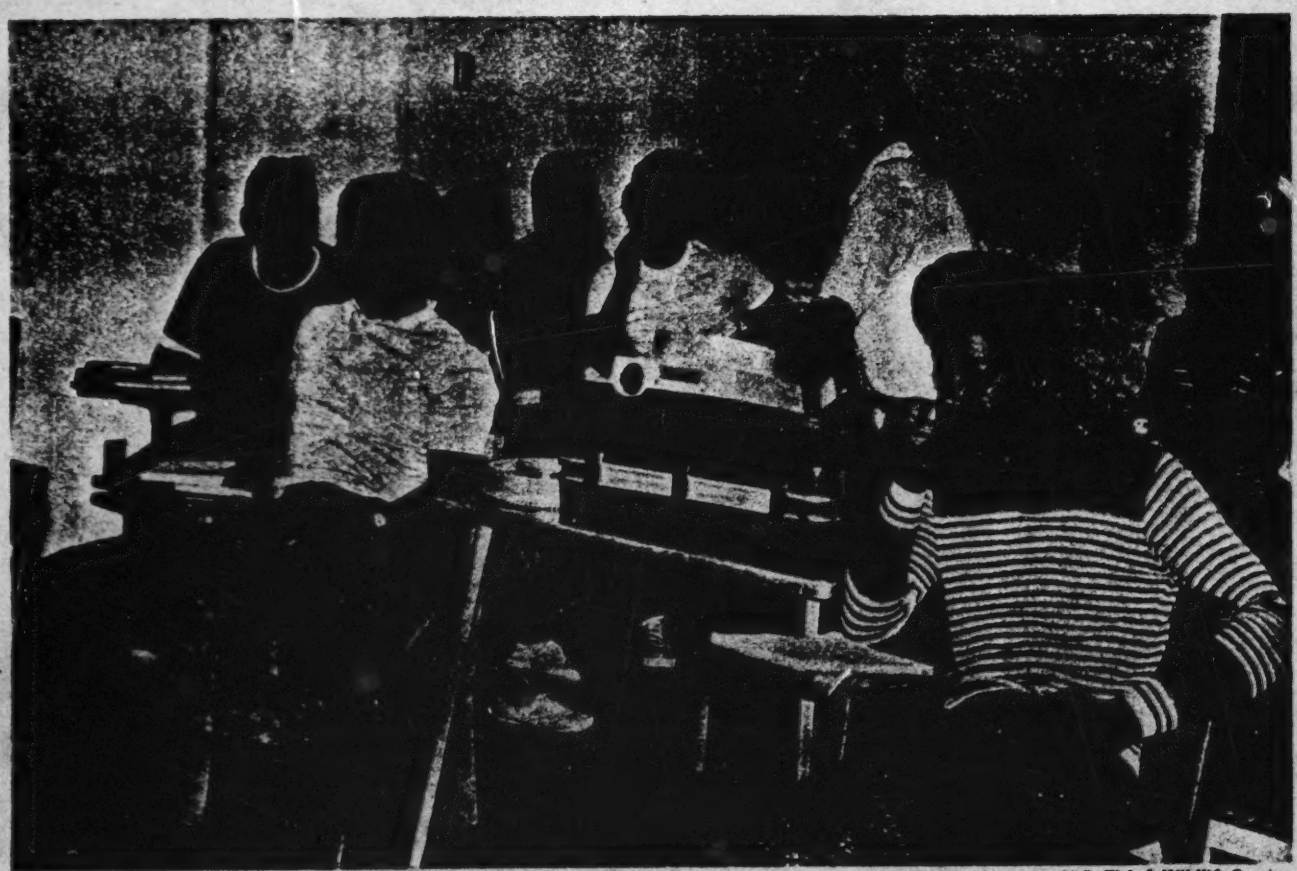
Special employment programs with particular usefulness for an auxiliary goal, such as affirmative action, should be judged on all accomplishments when they are evaluated. Many more agencies could use programs like Cooperative Education for minority recruitment.

TOGETHER

Many ideas, large and small, have been noted in these pages. They may seem disparate, as are the individuals and organizations addressed. But environmental and resource managers and scientists, of all people, can understand that disparate elements of all sizes are interrelated and interdependent. They can appreciate also that elements and relationships grow, and that the web of life becomes more secure as it becomes more diverse.

In the spirit of Slaughter's theorem, "Black studies is for white students, and [sciences] are for black students," and applying that maxim to other heritages as well, let us all explore new subjects and encourage new relationships. Together we can increase academic and professional opportunities for minority individuals, and perhaps more important, expand the scope of research and technology and enhance America's ability to solve its environmental and resource management problems.

Appendices



U.S. Fish & Wildlife Service

APPENDIX A

Human Environment Center Conference on College and University Education of Minority Students in Environmental and Natural Resource Fields, October 24-25, 1980

Consultants

Dr. Roberto Algaze Tenebaum, Dean
Academic Affairs
Regional Colleges Administration
University of Puerto Rico

Dr. John Bassett, Director of
Undergraduate Programs
School of Natural Resources
University of Michigan

Dr. Robert D. Bonner, Director
Division of Pure & Applied Sciences
Hampton Institute

Dr. Bertram W. Carnow, Director
Great Lakes Center for Occupational
Safety and Health
School of Public Health
University of Illinois

Dean Charles H.W. Foster
Yale School of Forestry and
Environmental Studies

David Jackson, Director
Native American Career Education in
Natural Resources
Humboldt State University

Erma Kneff
Human Resources Utilization Manager
The Weyerhaeuser Company

Dr. Shirley Malcom, Director
Office of Opportunities in Science
American Association for the
Advancement of Science

Claretta McDaniel, Program Grant Officer
National Association for Equal Opportunity
in Higher Education

Dr. Peter McKinney, Associate Dean
Harvard University Graduate School of
Arts and Sciences

Dr. Michael Olivas, Director of Research
League of United Latin American Citizens
National Educational Service Centers

Dr. Lynette Padmore, Assistant Dean
College of Science and Technology
Florida A & M University

Dr. Arthur Sacks, Administrator of
Academic Programs
Institute for Environmental Studies
University of Wisconsin-Madison

Willie Washington
Department of Biology
Central State University

Representatives of Federal Agencies

Dr. Bradford Brown
Northeast Fisheries Center
National Oceanic and Atmospheric
Administration

Robert Burnett, E.O. Coordinator
Occupational Safety and Health
Administration

Chere Calloway, Special Assistant to
the Assistant Secretary for
Fish, Wildlife and Parks
Department of the Interior

Jim Cannon
Bureau of Indian Affairs

Barbara L. Carter
Forest Service, U.S.D.A.

Curtiland Deville, E.O. Coordinator
Science and Education Administration
U.S. Department of Agriculture

Dr. Lionel Fernandez, Health Scientist Administrator
Office of Health Resources Opportunity
U.S. Public Health Service

Frank Gregg, Director
Bureau of Land Management
U.S. Department of the Interior

Robert Knox, Director
Office of Minority and Small Business Utilization
Environmental Protection Agency

Dr. William Lawrence
National Institute of Environmental Health Sciences

Natalie Lobe, Project Manager
Indian Training Program on Energy and Environment
U.S. Department of Energy

James Maes, Manager
Hispanic Employment Program
Soil Conservation Service, U.S.D.A.

Michael Moore, Workforce Development Staff
Environmental Protection Agency

Dr. Wilfred Nusser, Chief
Extra Mural Research Program
National Institute of Environmental Health Sciences

Vivian Moore and
Angela Shelby, University Affairs Staff
Office of Equal Opportunity
U.S. Department of Agriculture

William R. Taylor
Equal Opportunity Office
Occupational Safety and Health Administration

Robert Teeters, Assistant Chief
Office of Policy, Civil Works
U.S. Army Corps of Engineers

Doris Thompson, Deputy Director
Office of Equal Opportunity
U.S. Department of Agriculture

Human Environment Center

Jean C. Durning, Director
Minority Careers Program
Human Environment Center

Sydney Howe, Executive Director
Human Environment Center

# # #

APPENDIX B

PROGRAMS CITED IN THIS REPORT

Colleges and universities mentioned in this report are not listed here unless a particular program has been described; accredited institutions are listed in standard reference works. Many Native American colleges are members of the American Indian Higher Education Consortium (AIHEC), 950 South Dexter, Denver, Colorado 80222.

Most individuals quoted were participants in the Human Environment Center conference in October 1980, listed in Appendix A.

Minority Institution Programs (cited in Section II)

Hampton Institute, Center for Marine and Coastal Environmental Studies, Dr. Craig Ruddell, Director, Hampton, VA 23668.

Howard University Department of Macroenvironmental and Population Studies, Dr. Wil Wilson, Jr., Chairman, 2400 6th St., N.W., Washington, DC 20059.

Lummi College of Fisheries (formerly Lummi Indian School of Aquaculture and Fisheries), Richard Poole, Director, P.O. Box 11, Lummi Island, WA 98262.

New Mexico Highlands University, Environmental Science Program, Dr. Anthony F. Gallegos, Director, Las Vegas, NM 87701.

St. Augustine's College, Occupational Safety and Health Training, Dr. Roamless Hudson, Jr., Chairman, Department of Chemistry, Raleigh, NC 27611.

Tuskegee Institute Pre-Forestry Program, Ron Smith, Forester, Tuskegee, AL 36088.

University of Arkansas at Pine Bluff, Fisheries Department, Dr. Scott Newton, Head, Pine Bluff, AR 71601.

University of Maryland-Eastern Shore, Marine, Estuarine and Environmental Science, Dr. Thomas Hopkins, Head, Natural Science Department, Princess Anne, MD 21853.

University of Puerto Rico, Center for Energy and Environment Research, Dr. Juan Bonnet, Jr., Director, Caparra Heights Station, San Juan, PR 00935.

Majority Institution Programs (cited in Section III)

Colorado State University, College of Forestry and Natural Resources, Dr. Don Crews, Assistant Dean, or Jim Volpa, University Minority Recruiter for Science and Engineering, Fort Collins, CO 80523.

Humboldt State University, Native American Career Education in Natural Resources, David Jackson, Director, Arcata, CA 95521.

North Carolina State University, School of Natural Resources, Leroy C. Saylor, Dean, Raleigh, NC 27607.

Ohio State University, School of Natural Resources, Robert Henne, Secretary, 2120 Fyffe Rd., Columbus, OH 43210.

Tennessee Technological University, Career Awareness Institute, Dr. Gordon Hunter (Biology Department), Project Director, or Dr. Don Estes, Cooperative Fisheries Unit, Cookeville, TN 38501.

University of California, School of Public Health, Master of Public Health Degree Program for American Indians and Alaska Natives, Elaine Walbroek, Director, Berkeley, CA 94720.

University of Michigan, School of Natural Resources, Dr. William J. Johnson, Dean, or Dr. John Bassett, Director of Undergraduate Programs, Ann Arbor, MI 48105.

University of North Carolina-Wilmington, Dr. Gilbert Bayne, Marine and Environmental Science, Wilmington, NC 28403.

University of Wisconsin-Stevens Point, Natural Resources Career Education for American Indians, Gary Kmiecik, Director, Stevens Point, WI 54481.

Other Organizations (cited in Section IV)

Many environmental organizations are listed in the Conservation Directory *listed in the Bibliography.*

American Association for the Advancement of Science Office of Opportunities in Science, Dr. Shirley Malcom, Director, 1776 Massachusetts Ave., N.W., Washington, DC 20036.

American Geological Institute Minority Participation Project, William H. Matthews III, Director of Education, Box 10031 Lamar University Station, Beaumont, TX 77710.

American Society of Biological Chemists, Committee on Equal Opportunity for Minorities, Dr. Luther S. Williams, Chair, 9650 Rockville Pike, Bethesda, MD 20014.

Aspira Center for Education Equity, Rafael Valdivieso, Director, 1625 I St., N.W. #324 A, Washington, DC 20006. Aspira of America, 205 Lexington Ave., 12th Floor, New York, NY 10016.

Center for Environmental Intern Programs, John R. Cook, Jr., Director, or Susan Hunnewell, Assistant Director, 20 Providence St. #629, Boston, MA 02116.

League of United Latin American Citizens (LULAC) National Educational Centers, Jose Longoria, Executive Director, and LULAC National Scholarship Fund, Deborah Redmond, Coordinator, both at 400 1st St., N.W. #716, Washington, DC 20001.

National Association for Equal Opportunity in Higher Education (NAFEO), Dr. Samuel L. Myers, Executive Director, 2243 Wisconsin Ave., N.W., Washington, DC 20007.

National Technical Association, Inc., Willa Parker, Executive Director, 1425 H St., N.W. #701, Washington, DC 20005.

National Urban League, Vernon E. Jordan, President; Mildred Love, Director, Career Training and Economic Resources; Carol Gibson, Education Director; Vie Kaufman, Faculty, Career and Curriculum Development Program Director; Renee Dujean, Black Executive Exchange Program Director; Walter Stafford, Tri-State Minority Faculty Project Director; 500 East 62nd St., New York, NY 10021.

Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), Dr. Miguel Rios, President, or Dr. Frank Dukapoo, Vice President, P.O. Box 3831, Albuquerque, NM 87190.

Society of Spanish Engineers, Planners and Architects (SSEPA), Antonio Figueroa, Chairman, or Mr. Angel Rivera, P.O. Box 75 Church Street Station, New York, NY 10007.

Thompson's Island Education Center, Frank H. White, Executive Director, P.O. Box 127, Boston, MA 02127.

APPENDIX C

Sources of Lists of University Programs in Environment and Natural Resources

"Professional Forestry Instruction Offered in the U.S." and "Forest Technician Schools in the U.S. and Canada" (Jan. '78)

Society of American Foresters
5400 Grosvenor Lane
Washington, D.C. 20014

"Forestry Schools in the United States" (Jan. '74) by U.S. Department of Agriculture, Forest Service; for sale 35¢, stock number 0101-00351

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

"Universities and Colleges Offering Curricula in Wildlife Conservation" (Nov. '78)

The Wildlife Society
7101 Wisconsin Avenue, N.W. #611
Washington, D.C. 20014

"Fisheries Science and Related Courses in North American Colleges and Universities" (1977)

Sport Fishing Institute
608 - 13th Street, N.W., Suite 801
Washington, D.C. 20005

"Careers in Range Science and Range Management"

Society for Range Management
2760 W. Fifth Avenue
Denver, Colo. 80204

"Post-Secondary Environmental Education Programs", (Also in Environmental Protection Careers Guidebook) (Aug. '79)

Workforce Development Staff
U.S. Environmental Protection Agency (RD 675)
Washington, D.C. 20460

"Roster of Universities/Colleges Offering Courses/Programs in Toxicology" (compiled annually for August issue of Newsletter)

Forum for the Advancement of Toxicology
University of Tennessee Center for the Health Sciences
College of Pharmacy
874 Union Avenue
Memphis, Tenn. 38163

"Undergraduate and Graduate Degree Programs in Occupational Safety and Health" (1977)
"Associate Degree Programs in Occupational Safety and Health (1977)

Division of Training and Manpower Development
National Institute for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, Ohio 45226

"List of Accredited Programs in Landscape Architecture" (1978-79)

American Society of Landscape Architects
1900 M Street, N.W., Suite 750
Washington, D.D. 20036

"Colleges and Universities Offering Planning and Related Degree Programs" (Nov. '76)

American Institute of Planners
1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036

"Directory of Professional Preparation Programs in Recreation, Parks, and Related Areas" (Price: $3.00)

Sales, National Recreation and Park Association
1601 North Kent Street
Arlington, Virginia 22209

APPENDIX D-1

SEVEN NON-TRADITIONAL PREDICTORS OF ACADEMIC SUCCESS FOR ADMISSION OF SOME BLACK STUDENTS TO COLLEGE

Minority applicants often come from a background which is culturally different and about which a typical admission committee knows relatively little. To use traditional predictors with such students would be to overlook the academic potential they have shown in terms of their own culture....

1. Positive self-concept. Confidence, strong "self" feeling, strength of character, determination, independence..../Some/ successful minority students appear considerably different from their white counterparts....blacks who get high grades tend to have very atypical personality profiles vis-à-vis whites who get high grades...Thus on some measures the opposite use of the same predictor will select the best black and the best white students.

The successful minority student is more likely to be inclined toward, and experienced in, "going against the grain."

2. Understands and deals with racism. A realist, based on personal experiences of racism. Committed to fighting to improve the existing system. Not submissive to existing wrongs, nor hateful of society, nor a "cop out." Able to handle a racist system. Asserts that the school has a role or duty to fight racism.

3. Realistic self-appraisal. Recognizes and accepts any academic or background deficiencies and works hard at self development....individually, or with the school's help.

4. Prefers long-range goals to short-term or immediate needs. Understands and is willing to accept deferred gratification.

5. Availability of strong support person. Has a person of strong influence who provides advice.

6. Successful leadership experience. Has shown ability to organize and influence others within his or her cultural-racial context....may have shown leadership in less typical ways, such as working in their communities, or through their church, or even as a streetgang leader in high school.

7. Demonstrated community service...to his or her community. If minority students reject their background, it is likely they will have trouble in personal areas, such as self-concept, understanding racism, and realistic self-appraisal.

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*Excerpted from Racism in American Education: A Model for Change by William E. Sedlacek and Glenwood C. Brooks, 1976. Nelson-Hall. pp. 50-58.

APPENDIX D-2

II. The Academic Milieu

At the highly prestigious institutions, Harvard, Stanford and Chicago and to a lesser extent Duke, black students as are others, are under enormous academic pressure. Their identities are defined for them by their academic disciplines. "I am black," or "female", or "from Durham" become secondary to "I am pre-med" or "pre-law" or "business."

Even students who have gone to primarily white or to racially mixed schools have never experienced the feeling expressed by one student that "my lab partner would cut my throat if it meant an 'A' grade for him." This dog-eat-dog, Darwinian academic environment is totally foreign to the student from the all-black inner-city school.

Black students at the prestigious schools generally have both the intellectual ability and the academic skills to make it, but they usually have no prior experience with such rigorous academic requirements and such ruthless peer attitudes and practices. Their immediate task upon entry into the university is to learn how, as one student put it, "to master the university and its mythology." The more quickly students learn the language, the behavioral codes, expectations and other social nuances of the university community, the smoother will their adjustment be to the new environment.

This fierce competitiveness, born of exceedingly high standards and demands, practically forces black students to become combatants, not only with white peers and professors but also with each other. In the absence of elements of racism, the transition to the required "I am pre-med" might be no more difficult for blacks than for whites. However, the very real presence of racism, the constant reminders that black is allegedly inferior, just about makes it impossible to make that transition without carrying along racial identity also.

Black students at the public universities, Michigan, Rutgers and UCLA are not subjected to such rigorous academic requirements as at the private institutions studied, but neither are they the academic elite, possessors of the superior secondary school training which characterizes the private university students. The academic adjustment for the student at the public university is much slower and much more difficult. Most of these students do not come from an academic environment where study and scholarship are valued. As one student described the environment at UCLA, "There is some black on black pressure not to achieve." Accordingly, the student went on to say, "many students deliberately give the impression that they're not working very hard." The academic socialization of many of the public university black students has to include such factors as "permissibility to study (or to achieve academically)", "what to study" and "how to study".

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APPENDIX D-3

MINORITY PROGRAMS AND ACTIVITIES OF THE COLLEGE ENTRANCE EXAMINATION BOARD: A CRITICAL REVIEW AND A BRIEF LOOK AHEAD

Synopsis

The College Board's concern for the nation's minorities and the poor was first explicitly expressed in the mid- and late 1950s through its partipation in New York City's Demonstration Guidance Project and through its efforts to desegregate test centers. As the civil rights movement gained momentum in the early 1960s, attention came to be focused more and more on the use of tests and test scores with minority students in the college admissions process and on minority students' need for financial aid dollars. In these beginnings can be seen the roots of the problems facing minority youth in achieveing access to postsecondary education and the basis for the responses that the College Board has made to them.

Through its sponsorship of a series of later efforts similar to the Demonstration Guidance Project (such as Project Access, Project Open, Project Opportunity, and the Education Assistance Center), the College Board confirmed the findings of other similar projects: An infusion of dollars, time, and interest can overcome educational disadvantage, reduce the drop-out rate, increase performance levels, increase the graduation rate, and increase the numbers of minority students going on to higher education. Although the pay-off in human terms of the special projects may have been satisfying, the pay-off in changes in the Board's major testing programs (except for the institution of fee waivers) has been less than had been hoped for. Validity studies by the score and special studies by the dozen have confirmed the predictive validity of the College Board's basic test instruments, although charges of bias do persist in relation to the use of tests, the criteria against which they are validated, their reliability for non-white test takers and their Waspish language. As for College Board financial aid services, it is clear now that no amount of manipulation of the College Scholarship Service need-analysis system will improve the opportunities of the poor; only a massive increase in aid dollars, accompanied by adherence to the principle of aid to the neediest first, can do that. Research in the College Board's on-going programs to meet minority needs must continue, but real progress might possibly break out on another front.

Since the late 1950s the College Board has continued to integrate not just its test centers but its councils and staffs, moving groups and individuals from responsibilities focusing initially on minority concerns to ones affecting minority and majority students alike. Minority representation of staff becomes particularly important as the College Board seeks to respond on behalf of its institutional constituency to the growing interest on the part of the nation's youth in career opportunities. If all the College Board's efforts on behalf of minority students have thus far yielded such little return in terms of its traditional, on-going programs, the real hope may well lie in the new dimensions of human assessment that

are implicit in career education and other newly emerging concepts. This then is where the College Board should put its emphasis.

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SELECTED BIBLIOGRAPHY

Minority Colleges and Universities

Brown, George H., Nan L. Rosen, Susan T. Hill, and Michael A. Olivas, *The Condition of Education for Hispanic Americans.* National Center for Educational Statistics, U.S. Department of Education, 1980. U.S. Government Printing Office, Washington, DC 20402. 268 pp.

Conference of Science and Mathematics Faculty and/or Administrators of Predominantly Native American Colleges, *Final Report and Summary of Proceedings,* Prepared for National Institutes of Health by Project on Native Americans in Science, Office of Opportunities in Science, American Association for the Advancement of Science. 1977. 1776 Massachusetts Avenue, N.W., Washington, DC 20036. 96 pp. (currently out of print).

Directory of Historically Black Colleges and Universities in the United States. Bienniel. Published by National Alliance of Business, College/Industry Relations, 1015 15th Street, N.W., Washington, DC 20005. 96 pp. Single copies free.

The Moton Guide to American Colleges with a Black Heritage 1981-1983, Moton Memorial Institute, 2000 11th Street, N.W., Washington, DC 20001. 80 pp. Single copies free.

National Advisory Committee on Black Higher Education and Black Colleges and Universities, *Black Colleges and Universities: An Essential Component of a Diverse System of Higher Education.* 1979. U.S. Department of Education, 1100 17th Street, N.W., Suite 706, Washington, DC 20036. 93 pp. and Appendix.

____, *Still A Lifeline: The Status of Historically Black Colleges and Universities.* 1980. 61 pp.

____, *Annual Reports* and other special reports.

Turner, William H. and John A. Michael, "Traditionally Black Institutions of Higher Education: Their Identification and Selected Characteristics," 1978. National Center for Educational Statistics, U.S. Department of Education, Washington, DC 20202. 10 pp.

Minority Students on White Campuses

Breland, Hunter M., *Population Validity and College Entrance Measures.* 1979. College Entrance Examination Board. Order from College Board Publication Orders, Box 2815, Princeton, NJ 08541, 86 pp. $7.50.

Hanford, George H., *Minority Programs and Activities of the College Entrance Examination Board: A Critical Review and a Brief Look Ahead.* 1976. College Entrance Examination Board. 61 pp. Single copies free.

McDermott, Lillian C., Leonie K. Piternick, and Mark L. Rosenquist, "Helping Minority Students Succeed in Science," three part series. *Journal of College Science Teaching,* January, March and May 1980 issues. National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, DC 20009.

Sedlacek, William E. and Glenwood C. Brooks, Jr., *Racism in American Education: A Model for Change.* 1976. Chicago: Nelson-Hall. 226 pp.

Smith, Donald H., "Admissions and Retention Problems of Black Students at Seven Predominantly White Universities," *Metas,* Volume 1, Number 2, Spring-Summer 1980, Aspira of America, Inc., 205 Lexington Avenue, New York, NY 10016.

Natural Resources, Environment and Science Education

The Black Collegian (Issue introducing students to environmental jobs) February-March 1981. 1240 South Broad Street, New Orleans, LA 79125.

Conservation Directory: A List of Organizations, Agencies and Officials Concerned with Natural Resource Use and Management. Annual. The National Wildlife Federation, 1412 16th Street, N.W., Washington, DC 20036. 290 pp. $4.00.

Directory of Post-Secondary Environmental Education, National Environmental/Energy Workforce Assessment, Phase III. 1979. National Field Research Center, Inc. 230 E. Benton, P.O. Box 287, Iowa City, IA 52240. 18 small volumes.

Environmental Protection Careers Guidebook, U.S. Department of Labor and U.S. Environmental Protection Agency. 1980. (Appendix 2 condenses *Directory* of National Environmental/Energy Workforce Assessment.) Request from U.S. Department of Labor, Employment and Training Administration, Attn: Jules Spector, Washington, DC 20213; or for sale ($6.50) by U.S. Government Printing Office.

Frumkin, Howard and Howard Hu, eds., *Occupational and Environmental Health: A Resource Guide for Health Science Students.* 1980. (A list of experiential learning opportunities developed by the Occupational and Environmental Health Task Force of the American Medical Student Association, but applicable to other students as well.) National Institute for Occupational Safety and Health, Division of Training and Manpower Development, U.S. Department of Health and Human Services. Request from Publication Dissemination Office, NIOSH, Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, OH 45226. 59 pp. Single copies free.

Hall, Paula Quick and Roger Long, "Associations of/for Scientists of Racial and Ethnic Minority Groups" 1980. Office of Opportunities in Science, American Association for the Advancement of Science, 1776 Massachusetts Avenue, N.W., Washington, DC 20036. 16 pp. Free.

Minority Education for Environmental and Natural Resource Professions: Report 1, Before College. 1980. Human Environment Center, 1302 18th Street, N.W., Washington, DC 20036. 54 pp. Single copies free.

Financial Aid

Byrd-Johnson, Lynda and Carol Smith, *Selected List of Postsecondary Education Opportunities for Minorities and Women,* 1980 edition, U.S. Department of Education, EYEH 1100 17th Street, N.W., Suite 702-6, Washington, DC 20202; or for sale by U.S. Government Printing Office. 106 pp. Descriptions of general and special-subject financial aid and opportunities.

Education Assistance for American Indians and Alaska Natives. Master of Public Health Program for American Indians, School of Public Health, Earl Warren Hall, University of California, Berkeley, CA 94720. Emphasis on health fields.

"Five Federal Financial Aid Programs 1981–82: A Student Consumers Guide," free, Office of Student Financial Assistance, U.S. Department of Education, ROB-3 Room 4682, 400 Maryland Avenue, S.W., Washington, DC 20202. Information on Basic and Supplemental Educational Opportunity Grants (BEOG and SEOG), College Work-Study and two loan programs. Also reproduced in Byrd-Johnson and Smith, cited above.

"How to Pay for Your Health Career Education: A Guide for Disadvantaged Students," free from U.S. Department of Health and Human Services, Public Health Service, Health Resources Administration, 3700 East-West Highway, Room 1050, Hyattsville, MD 20782; or for sale by U.S. Government Printing Office. Garrett Morris poster with extensive information on reverse.

Johnson, Willis, ed., *Directory of Special Programs for Minority Group Members: Career Information Services, Employment Skills Banks, Financial Aid Sources,* third edition, Garrett Park Press, Garrett Park, MD 20766, 612 pp. $19.00 prepaid. Very comprehensive compilation, indexed.

Leider, Robert, *Don't Miss Out: The Ambitious Student's Guide to Scholarships and Loans,* fifth edition 1980, Octamaron Associates, P.O. Box 3437, Alexandria, VA 22302, 56 pp. $2.00. Information, strategies and sources of money presented in lively style.

"Meeting College Costs," College Scholarship Service of the College Board, College Board Publications, Box 2815, Princeton, NJ 08541. Free. How to estimate your eligibility and how to apply for aid.

Need a Lift? To Educational Opportunities, Careers, Loans, Scholarships, Employment, revised annually, American Legion Education Program, P.O. Box 1055, Indianapolis, IN 46206, 136 pp. $1.00. Extensive list of grants, loans, and reference sources.

A Selected List of Fellowship Opportunities and Aids to Advanced Education, 1980, prepared by Commission of Human Resources, National Research Council for N.S.F. Free from the Publications Office, National Science Foundation, 1800 G Street, N.W., Washington, DC 20550. Undergraduate, graduate and postdoctoral opportunities plus bibliography.

"Selected List of Financial Aid Sources for Minority Education in Environmental and Natural Resource Professions," 1981, single copies free from Human Environment Center, 1302 18th Street, N.W., Suite 301, Washington, DC 20036. 28 pp. Undergraduate and graduate aid sources for minorities or for environmental or resource studies.